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ABSTRACT

A study assessed the feasibility of conducting a national cost-benefit analysis of vocational education and presented recommendations for future research on the relationship between vocational education costs and benefits. Following an analysis of the state of the art in utilizing cost-benefit methodologies to evaluate vocational education, a review was conducted of the measurement problems that might confront a study team performing a cost-benefit analysis; then, after consultation with technical experts, strategies for developing a cost-benefit model of vocational education were formulated and implemented. The model (which included variables in the areas of monetary benefits, non-pecuniary benefits, current costs, and opportunity costs) then became the subject of a Delphi analysis. Input was collected from technical experts participating in the Delphi analysis with respect to the desirability and feasibility of the components of the specified model as well as the feasibility of overcoming some anticipated modeling and implementation problems. Analysis of thse comments resulted in a series of recommendations for a national cost-benefit study. The survey and its results are included in the study report. (Related project reports are available separately through ERIC--see note.) (MN)

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DESIGN OF A NATIONAL COST-BENEFIT STUDY OF VOCATIONAL EDUCATION AT THE SECONDARY, POSTSECONDARY AND ADULT LEVELS:

COST-BENEFIT FEASIBILITY REPORT

BY:

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Dr. Mark Shugoll, Principal Investigator
Mr. Tim Helms, Research Associate

Department of Education Contract Number: 300-80-0747

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October 9, 1981

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SECTION 1

INTRODUCTION

OVERVIEW

Cost-benefit analysis is one important method for improving resource allocation in the general area of social welfare. The Department of Education has contracted with Rehab Group, Inc. for a study assessing the feasibility of performing a national cost-benefit analysis of secondary, postsecondary, and adult vocational education. The components of this study include:

- An analysis of the measurement problems in performing a national cost-benefit study;
- An assessment of the state of the art in applying cost-benefit methodologies to vocational education; and
- Recommendations concerning the feasibility of performing a national cost-benefit study.

Each of these study components is examined in a separate document. The reports are written as companion pieces utilizing similar format and terminology. In addition, a final report synthesizes the major findings of all study areas into one document.

FEASIBILITY REPORT OBJECTIVES

This paper has two primary objectives. One is to report the findings of the Rehab study team on the feasibility of conducting a national cost-benefit analysis of vocational education. The other is to present recommendations for future research on the relationship between vocational education's costs and benefits.

The conclusions drawn are based on an interactive series of research tasks. The first relevant task was an extensive analysis of the state of the art in utilizing cost-benefit methodologies to evaluate vocational education. The results of this state of the art overview are presented in a separate report entitled Design of a National Cost-Benefit Study of Vocational Education at the Secondary, Postsecondary and Adult Levels: State of the Art Report.

A second task, the results of which partially determine the conclusions presented in this report, was a comprehensive review of the measurement problems that might confront a study team performing a national cost-benefit analysis of vocational education. The feasibility of conducting a national study and the necessity for future research are strongly influenced by the accuracy of available measures of the costs and benefits of vocational education. These measurement issues are reviewed in a companion report, Design of a National Cost-Benefit Study of Vocational Education at the Secondary, Postsecondary and Adult Levels: Cost-Benefit Measurement Report.

A third source contributing to the remarks made in this document was a Delphi study. This exercise solicited opinions from various technical experts in the areas of vocational education and/or cost-benefit analysis on the desirability and feasibility of numerous components of a cost-benefit model of vocational education. The Delphi methodology is explained later in this report.

FEASIBILITY REPORT FORMAT

This report consists of four sections. Following the introductory remarks, Section 2 discusses the steps in building a cost-benefit model of vocational education. The early steps in this process are then simulated to produce a preliminary specification of the potential components of a vocational education cost-benefit model. This specified model will be the subject of the Delphi analysis. The specification procedure draws technical guidance from the earlier work performed for the state of the art overview and the evaluation of cost-benefit measurement problems. Section 3 summarizes the opinions expressed by various technical experts in the Delphi exercise. These opinions focus on the desirability and feasibility of many of the components in the specified model, as well as on the feasibility of overcoming some anticipated modeling and implementation problems. Section 4 presents conclusions on the feasibility of performing a national cost-benefit analysis of vocational education and recommendations for future research in the cost-benefit area.

SECTION 2

BUILDING A COST-BENEFIT MODEL OF VOCATIONAL EDUCATION

INTRODUCTION

In order to assess the feasibility of performing a national cost-benefit study of vocational education, a preliminary investigation of the potential components of the model must be undertaken. This is because the feasibility of conducting a national study depends upon the variables that make up the model, the ability to operationalize these variables, and the availability of data to implement the model.

A model specifies the variables that make up a functional system and the interrelationships between these variables. This section describes the model building process. First, it discusses the utility of a cost-benefit model and proposes a general modeling format. Second, it explains a strategy for developing a cost-benefit model that is consistent with that format. Third, it employs the modeling format and strategy to produce a very preliminary specification of a cost-benefit model of vocational education. The desirability and feasibility of this specification was analyzed using a Delphi analysis. The results of this analysis are reported in Section 3.

UTILITY OF A COST-BENEFIT MODEL

The utility of a well-designed model is multi-fold. First, it can illuminate a comprehensive range of policy options in that the model building process is an information generation and problem identification process. A policy decision that considers the issues raised in the modeling process may be made with more complete information than in other circumstances. Second, by specifying the particular factors in a functional system, the modeling process signals the type of technical expertise needed in the decision-making process. Consultation with the proper technical experts can contribute to a more educated policy decision. Third, since revenues are not infinite, policy makers must choose among alternative programs to allocate limited funds. It is quite rational to base such decisions, in part, on the relationship between program costs and benefits. Careful modeling can specify this relationship which then can be quantified using various cost-benefit analytical techniques.

Fourth, the presence of a model can defend a decision maker against criticism. Policies are often evaluated based on the success of an outcome rather than the soundness of a decision. Many sound decisions with the potential for positive outcomes produce less than anticipated results due to intervening variables and stochastic events. Regardless of the outcome, few can argue with the wisdom of a decision based on weighing the expected advantages and disadvantages before undertaking a course of action.

Cost-benefit modeling (as well as subsequent cost-benefit analysis) is not a substitute for managerial judgment. Rather, it is a contributing factor to making sound management decisions. Cost-benefit modeling (and analysis) can help increase the information available to a policy maker which results in superior decisions to those based solely on subjective judgment.

FORMAT OF A COST-BENEFIT MODEL

This sub-section discusses the interrelationships among the components of a cost-benefit model. These components are:

- Theoretical sub-models
- Theoretically complete global model
- Operational global model
- Operational sub-models

These interrelationships are displayed graphically in Figure 2.1. This figure also illustrates the diversity of potential operational sub-models in any cost-benefit analysis.

The format proposed for constructing a cost-benefit model of vocational education is influenced by the breadth of the vocational education enterprise. Vocational education delivers services on secondary, postsecondary, and adult levels; offers over 400 course types in seven occupational program areas; provides technical instruction in a variety of institutional settings; and teaches diverse student populations with varying educational needs. Because of this breadth, it is impossible to create one simple model to

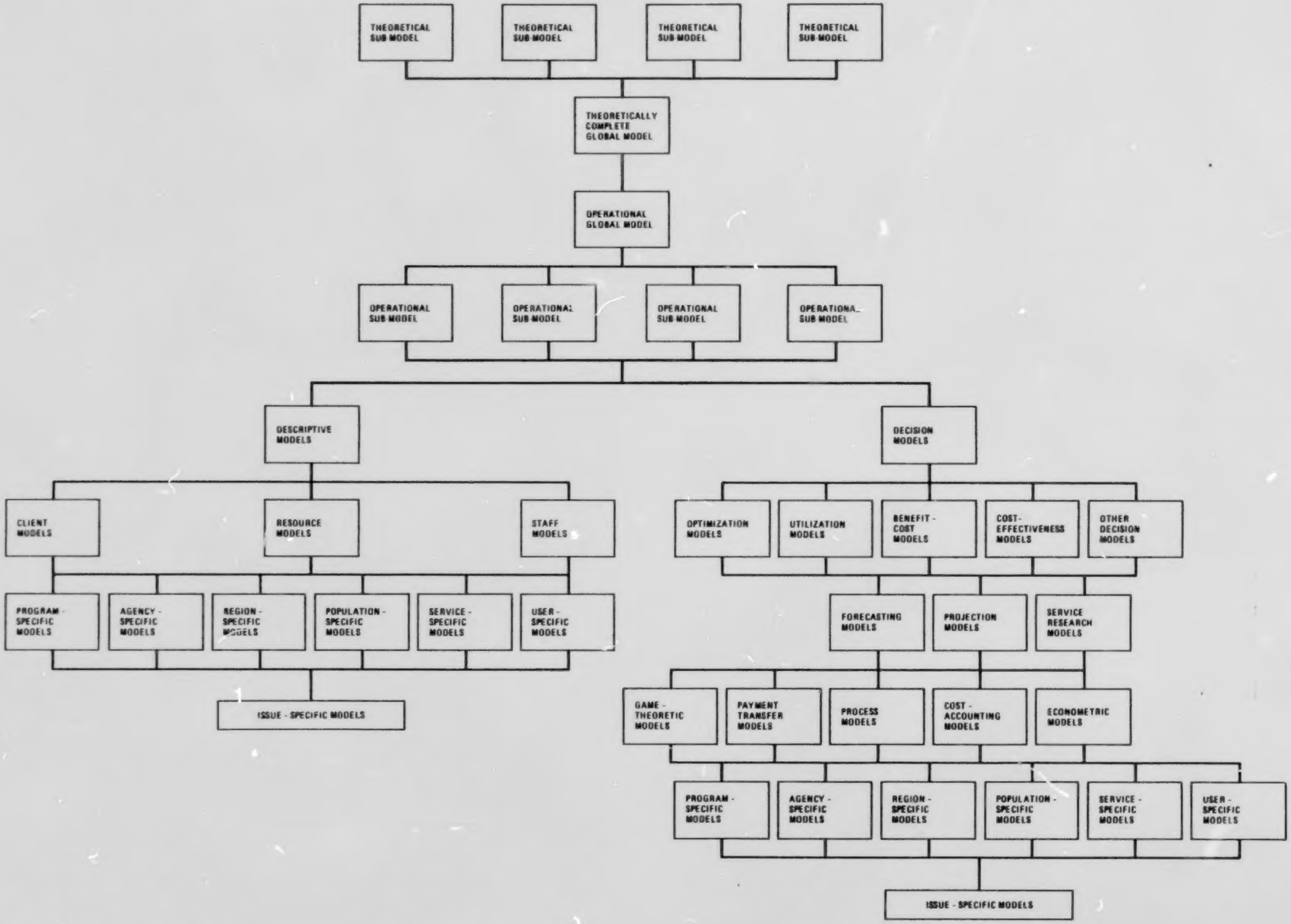
THEORETICAL SUB MODEL
THEORETICAL SUB MODEL
THEORETICAL SUB MODEL
THEORETICAL SUB MODEL
THEORETICALLY COMPLETE GLOBAL MODEL
OPERATIONAL GLOBAL MODEL
OPERATIONAL SUB MODEL
OPERATIONAL SUB MODEL
OPERATIONAL SUB MODEL
OPERATIONAL SUB MODEL
DESCRIPTIVE MODELS
DECISION MODELS
CLIENT MODELS
RESOURCE MODELS
STAFF MODELS
OPTIMIZATION MODELS
UTILIZATION MODELS
BENEFIT - COST MODELS
COST-EFFECTIVENESS MODELS
OTHER DECISION MODELS
PROGRAM - SPECIFIC MODELS
AGENCY - SPECIFIC MODELS
REGION - SPECIFIC MODELS
POPULATION - SPECIFIC MODELS
SERVICE - SPECIFIC MODELS
USER - SPECIFIC MODELS
ISSUE - SPECIFIC MODELS
FORECASTING MODELS
PROJECTION MODELS
SERVICE RESEARCH MODELS
GAME - THEORETIC MODELS
PAYMENT TRANSFER MODELS
PROCESS MODELS
COST - ACCOUNTING MODELS
ECONOMETRIC MODELS
PROGRAM - SPECIFIC MODELS
AGENCY - SPECIFIC MODELS
REGION - SPECIFIC MODELS
POPULATION - SPECIFIC MODELS
SERVICE - SPECIFIC MODELS
USER - SPECIFIC MODELS
ISSUE - SPECIFIC MODELS

Figure 2.1. Interrelationships Between the Theoretical Sub-Models, Theoretically Complete Global Model, Operational Global Model, and Operational Sub-Models.

evaluate the costs and benefits of the entire realm of vocational education. Rather, a series of theoretical sub-models with unique components must be designed.

When the universe of theoretical sub-models is specified and logically interrelated, a theoretically complete global model exists. The theoretically complete global model reflects all the factors in the vocational education system regardless of the ability to measure or interpret them. It also characterizes the relationship between vocational education and the environment in which it operates.

It is probable that some of the specified variables in a theoretically complete global model cannot be measured and/or some of the interrelationships cannot be operationalized. This may be due to the unavailability of data or simply to the lack of accurate measurement tools. In such instances, it is necessary to simplify the model by creating an operational global model. This model includes all factors of the functional system that can be measured and interpreted. Therefore, the operational global model trades off the thoroughness of the theoretically complete global model in favor of practicality. It is the operational global model, rather than the theoretically complete global model, that is the basis for executing a cost-benefit analysis.

The operational global model is actually an aggregation of operational sub-models. Very often one or more of the sub-models is implemented in a cost-benefit analysis rather than the operational global model. Which of the sub-models are employed may depend upon what the particular research question is, how the results will be utilized, and/or who is the potential user of the information resulting from the analysis.

Very often, the guidelines of a cost-benefit research project are so broad that they are almost global. Nevertheless, limited resources may force a study team working on such a project to choose among the various sub-models rather than implementing the operational global model. In such cases, the universe of operational sub-models may be prioritized based on the needs of the sponsoring agency, the desires of those in the field who will use the results of the analysis, the opinions of technical experts, or the logic of the study team.

STRATEGY FOR MODEL DEVELOPMENT

In order to maximize the effectiveness and validity of a model, the evaluation of a service system utilizing cost-benefit modeling must be based on a carefully specified strategy for model development. One potential strategy is diagrammed in Figure 2.2. and discussed subsequently. This strategy is based on the format of a theoretically complete global model, an operational global model, and their respective sub-models.

Stage One - Identify Model Requirements

The first stage in model development is identifying the requirements for the model or model system. This necessitates delineation of the general purpose of the evaluative model, the potential users of the model, and the particular needs and concerns of the project team and potential user groups. As indicated, the model specification stage must be based on input from the potential users of the model rather than by the study team alone. This will increase the chances that the final form of the model will be responsive to the needs of its users.

Stage Two - Identify Anticipated Problems

The second stage of model construction is the identification of anticipated problems in the design, operationalization, implementation, utilization, and evaluation of the model. Among the problems that are typically identified are the unavailability of data, political constraints, disparity between the technical sophistication of the model builders and the model users, information processing limitations, financial restraints, reluctance of potential users to accept the model, and inability to accurately measure all the costs and benefits of a program. Again, identifying potential problems should be a cooperative effort between the model builders and proposed model users. If potential problems are anticipated in advance, a study team can investigate alternatives that will maximize the validity of a model given the projected restraints.

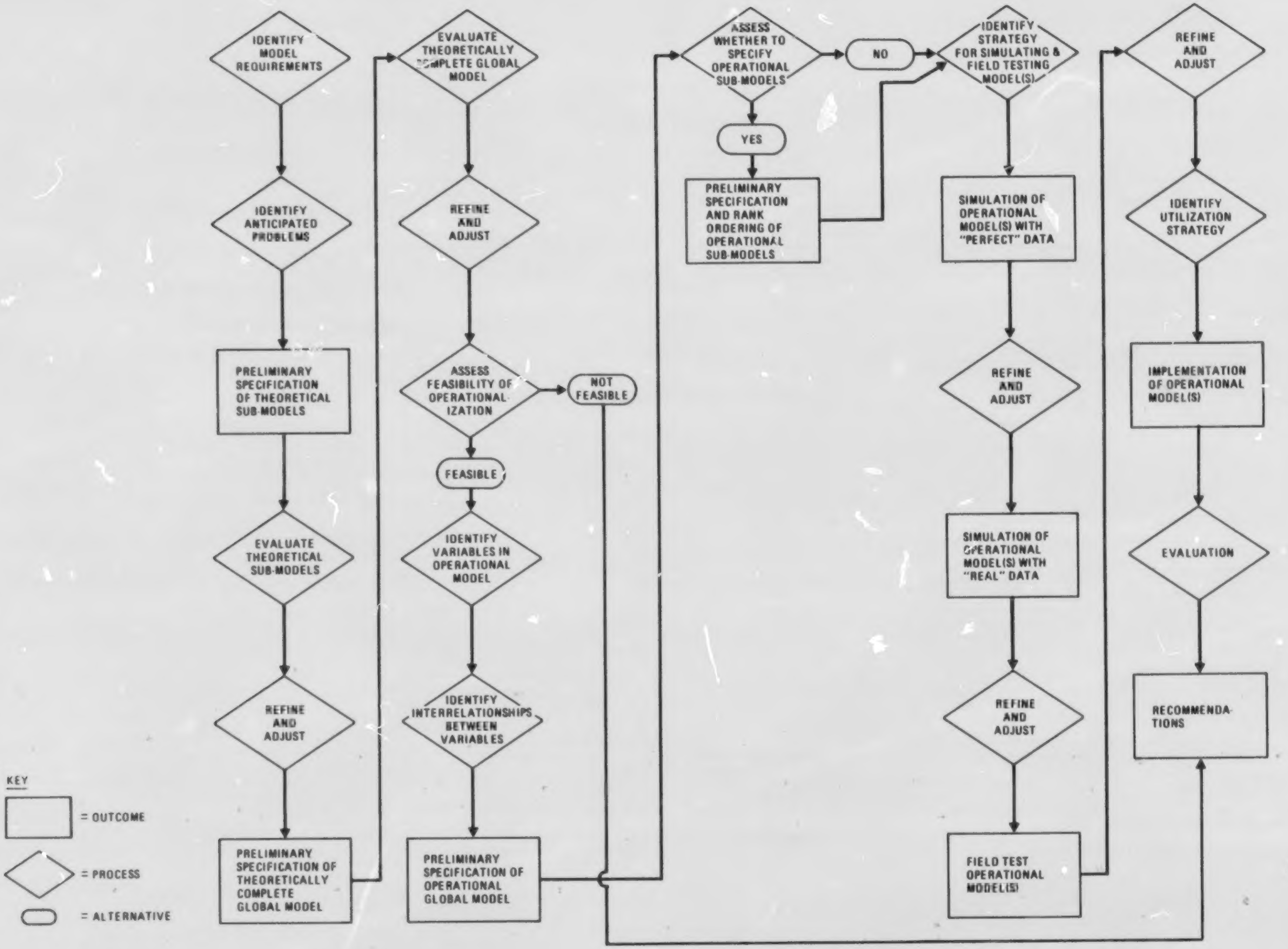
IDENTIFY MODEL REQUIREMENTS
IDENTIFY ANTICIPATED PROBLEMS
PRELIMINARY SPECIFICATION OF THEORETICAL SUB-MODELS
EVALUATE THEORETICAL SUB-MODELS
REFINE AND ADJUST
PRELIMINARY SPECIFICATION OF THEORETICALLY COMPLETE GLOBAL MODEL
EVALUATE THEORETICALLY COMPLETE GLOBAL MODEL
REFINE AND ADJUST
ASSESS FEASIBILITY OF OPERATIONAL-IZATION
NOT FEASIBLE
FEASIBLE
IDENTIFY VARIABLES IN OPERATIONAL MODEL
IDENTIFY INTERRELATIONSHIPS BETWEEN VARIABLES
PRELIMINARY SPECIFICATION OF OPERATIONAL GLOBAL MODEL
ASSESS WHETHER TO SPECIFY OPERATIONAL SUB-MODELS
NO
YES
PRELIMINARY SPECIFICATION AND RANK ORDERING OF OPERATIONAL SUB-MODELS
IDENTIFY STRATEGY FOR SIMULATING & FIELD TESTING MODEL(S)
SIMULATION OF OPERATIONAL MODEL(S) WITH "PERFECT" DATA
REFINE AND ADJUST
SIMULATION OF OPERATIONAL MODEL(S) WITH "REAL" DATA
REFINE AND ADJUST
FIELD TEST OPERATIONAL MODEL(S)
REFINE AND ADJUST
IDENTIFY UTILIZATION STRATEGY
IMPLEMENTATION OF OPERATIONAL MODEL(S)
EVALUATION
RECOMMENDA-TIONS
KEY
= OUTCOME
= PROCESS
= ALTERNATIVE

Figure 2.2. The Cost-Benefit Model Development Process

Stages Three and Four - Specify and Evaluate Theoretical Sub-Models and Theoretically Complete Global Model

Stage three is the preliminary specification of a series of theoretical sub-models. This stage combines the conclusions about model requirements (stage one) and potential problems (stage two) with technical information on the system being evaluated (e.g., vocational education) and the analytical approaches to relating program costs and benefits. After the preliminary specification, the models are reevaluated, refined, and adjusted. In stage four, the theoretical sub-models are integrated into a theoretically complete global model which is evaluated by the study team and potential users, and then further refined and adjusted.

Stage Five - Assess Feasibility of Operationalizing Model

Once the theoretical sub-models and theoretically complete global model are specified, the feasibility of creating an operational version of the model must be determined. This is done in stage five. It is appropriate for the potential users, as well as the model builders, to have input into this decision.

Stage Six - Identify Variables in Operational Model

If construction of an operational model is deemed feasible, the next stage in model development is to identify the variables to be incorporated into the operational model. Identification is accomplished by utilizing existing measures of variables that have been employed successfully in past research or by generating new measures (which must then be tested for reliability and validity).

Stages Seven and Eight - Identify Interrelationships between Variables in Operational Model and Create Hierarchy of Sub-Models

When variable identification is complete, the study team must construct the interrelationships between variables. These interrelationships must be consistent with general theory in the system being studied and with statistical theory. This stage culminates in the development of an operational global model. If only selected components of the operational global model are to be analyzed, a strategy for creating a hierarchy of sub-models must be developed.

When this is completed, the operational global model or the operational sub-models selected must be subjected to evaluation via simulation and field trial.

Stage Nine - Simulations of Operational Model or Sub-Models

It is recommended that two simulation steps be utilized. The first is an evaluation of the model using "perfect" data fabricated specifically for this purpose. This artificial data set should be developed to reflect the range of possible model applications which might be found under real circumstances. This type of simulation will permit inspection of the model's ability to handle data and withstand manipulation. After this simulation, the model should be reevaluated and necessary refinements made.

The second simulation should use "real" data, that is, information from an existing data set. At this stage, the behavior of the model in the context of imperfect data collected for other purposes can be observed. This may uncover unanticipated additional limitations of the model. This second simulation should be carried out through the analysis and interpretation phases so that a relatively complete judgment may be made concerning the internal and external validity and reliability of the model. At this time, the model should again be reevaluated and any necessary adjustments made.

Stages Ten, Eleven, Twelve, Thirteen, and Fourteen - Field Test Operational Model or Sub-Models, Identify Utilization Strategy, Implement Model(s), Evaluate Model(s), Make Recommendations

The next stage in the model development process is a field test under fully operational conditions. This will provide a final examination of the quality of the model. The field test should be implemented in diverse situations which are representative of the anticipated applications of the global operational model or operational sub-models. The results of the field test will be used to make final adjustments to the model prior to identifying a strategy for utilizing the model, implementing the model, evaluating the model, and submitting recommendations.

THE BEGINNINGS OF A MODEL SPECIFICATION

In order to help assess the feasibility of performing a national cost-benefit analysis of vocational education, a very preliminary specification of the potential variables in this model was attempted. Once completed, the Delphi panel could evaluate the desirability and feasibility of each of the variables.

To accomplish this preliminary specification, the study team simulated the first three stages in the model development process discussed in the previous sub-section. This simulation was hampered by the fact that the general purpose and potential users of the cost-benefit analysis (stage one) were not yet fully known. As a result, a series of hypothetical purposes and user groups were identified to guide the model building process. These user groups along with their particular needs are summarized below:

- The Federal Government, whose needs might include allocating federal funds to the most efficient alternative programs.
- State governments, whose needs might include allocating state funds, and in the advent of block grants, federal funds, to the most efficient alternative programs.
- State education agencies, whose needs might include determining how to distribute school revenues to maximize educational output in their schools.
- Local education agencies, whose needs might include making efficient investments in alternative vocational programs.
- Educational institutions, whose needs might include increasing the efficiency of vocational programs.
- Individuals, whose needs might include determining whether vocational training will result in increased income, career advancement, or other benefits.
- Special needs populations, whose needs might include determining whether vocational training will result in various monetary and nonpecuniary benefits.

Stage two of the development process calls for the identification of anticipated problems in the design, operationalization, implementation, utilization, and evaluation of the model. This problem identification is intended to be a joint task between the model builders and model users. Since this is a simulation and user groups are presently unknown, the study team substituted input from various technical experts in both vocational education and/or cost-benefit analysis. A long list of potential problems was identified by the study team and technical experts. The major problems are summarized subsequently:

- Lack of available data types, particularly in the areas of program costs and student employment and wage histories
- Lack of follow-up data
- Disparities in the quality and timeliness of data between states
- Resistance in the field to use of VEDS data, which is the most recent attempt at national data reporting in vocational education
- Lack of information on the duration and exposure of vocational education
- Lack of standard definitions of vocational education program enrollment
- Difficulties in developing a model that meets the needs of diverse user groups
- Problems in securing cooperation from potential user groups
- Lack of acceptance or agreement among users of previous cost-benefit studies
- Measurement inconsistencies between alternative analytical approaches to relating costs and benefits
- Difficulties in selecting appropriate comparison groups
- Difficulties in controlling for differences in non-educational variables between comparison groups
- Difficulties in controlling for differences in program quality
- Problems in treating the potential divergence between social benefits and costs and private benefits and costs
- Difficulties in measuring joint costs
- Difficulties in choosing between average cost and marginal cost methods
- Difficulties in calculating the opportunity costs of vocational enrollment

- Difficulties in measuring the consumption benefits of vocational training
- Difficulties in measuring non-pecuniary benefits and costs
- Difficulties in translating non-pecuniary benefits and costs into monetary values
- Difficulties in interpreting the impact of an earnings multiplier effect
- Problems in determining appropriate discount rates
- Difficulties in formulating a concise operational model given the breadth of vocational education
- Financial restraints

The last two limitations suggest one additional problem. Since the vocational education enterprise is so diverse, a series of operational sub-models composed of different variables will need to be developed. Given funding limitations, it is unlikely that all the sub-models can be implemented. Therefore, a final problem facing a national cost-benefit study team is determining an acceptable strategy to prioritize the sub-models.

Stage three of the development process is the actual specification of the variables in the model and their interrelationships. In its most general form, a cost-benefit model of vocational education can be broken down into two functional equations:

$B = f(X_1 \ldots X_m, X_n \ldots X_z)$, where
B = The benefits of vocational education
$X_1 \ldots X_m$ = Monetary benefits
$X_n \ldots X_z$ = Non-pecuniary benefits

and

$C = f(Y_1 \ldots Y_m, Y_n \ldots Y_r, Y_s \ldots Y_y, Y_z)$ where
C = The costs of vocational education
$Y_1 \ldots Y_m$ = Current costs
$Y_n \ldots Y_r$ = Capital costs
$Y_s \ldots Y_y$ = Opportunity costs
Y_z = Interest on school debt

Table 2.1 breaks down each of the broad categories included in the functional equations into its component parts.

Specifications of the model also depend upon the functional relationships between variables. Among the factors that affect the nature of these functional relationships are:

- Selecting a measurement strategy for joint costs;
- Selecting marginal or average cost methods;
- Selecting an appropriate discount rate;
- Choosing comparison groups;
- Choosing a unit of student participation;
- Controlling for cost differentials between districts;
- Controlling for differences in non-educational variables between students;
- Controlling for differences in program quality;
- Treating the divergence between social benefits and costs and private benefits and costs; and
- Interpreting the impact of an earnings multiplier effect.

Clearly, this specification of the model is preliminary and quite general. However, this broad specification is adequate to identify the basic components of a cost-benefit analysis of vocational education. The desirability and feasibility of utilizing these components in a national study can be assessed by soliciting reaction from a panel of experts in the areas of vocational education and/or cost-benefit analysis. The results of such a survey of experts are reported in Section 3.

TABLE 2.1. A Partial Listing of Potential Variables in a Cost-Benefit Model of Vocational Education

Monetary Benefits

- Annual income
- Fringe benefits (e.g., health insurance, vacations with pay)
- Monetary benefits accruing to students who enroll in vocational classes purely for consumption purposes

Non-Pecuniary Benefits

- Greater job opportunities
- Contentment with educational training
- Higher job satisfaction
- Positive work attitude
- Employers' satisfaction with employee performance
- Permanence of job
- Lower crime rates
- Better citizenship
- Greater sense of well being

Current Costs

- Administration costs
- Instructional costs
- Costs of plant operation
- Costs of plant maintenance
- Fixed charges
- Costs of other school services

Capital Costs

- Building costs
- Land acquisition costs
- Costs for major equipment

Opportunity Costs

- Foregone Income
- Cost of using plant for alternative purposes

SECTION 3

DELPHI EXERCISE

INTRODUCTION

This section discusses the Delphi exercise that solicited informed opinions on the desirability and feasibility of various components in the cost-benefit model broadly specified in Section 2. The section opens with a general explanation of Delphi analysis. This is followed by a description of the survey methodology employed in this project. The section concludes with a summary of the results of the Delphi analysis.

DELPHI ANALYSIS

Delphi analysis is "a method for the systematic solicitation and collation of informed judgments on a particular topic."[1] In this methodology, information is usually collected from a respondent group through a survey instrument. However, the methodology is significantly different from standard survey design.

For example, respondents are sent a series of questionnaires at established intervals. Each subsequent questionnaire builds on the issues raised or the responses received in the previous questionnaire. There are typically 2 to 4 rounds of questions, although some Delphi exercises may be longer.

The Delphi methodology is also distinct from traditional survey designs because it includes a well-defined mechanism for group feedback. That is, respondents are usually sent a summary of the results of previous iterations of the questionnaire as well as any additional opinions volunteered by other panelists. The logic behind the feedback component of the Delphi methodology is that it allows the diverse expertise of the respondent group to be shared with other panelists, and participants to be informed of the degree of consensus or polarization in the group.

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[1] Murray Turoff, "The Design of a Policy Delphi," Technological Forecasting and Social Change. 2 (1970), p. 149.

A third unique aspect of the Delphi technique is that it encourages participants not to feel constrained by the formal survey instrument. Respondents are encouraged to critique, rewrite, or suggest new questions; to write justifications of their answers; and/or to include general comments on the issues being discussed.

The typical respondent group in a Delphi exercise also varies from that in a traditional survey. Respondents are usually technical experts in a given field or senior members of an organization. They are selected specifically because of their expertise and, therefore, are not a random sample of the general population. The number of respondents in an average Delphi analysis ranges between 10 and 50.

The Delphi technique may serve numerous objectives. Turoff suggests that these objectives include:[2]

- Determining or developing a range of possible alternatives;
- Exploring or exposing underlying assumptions or information leading to differing judgments;
- Seeking out information which may generate a judgmented consensus on the part of a respondent group;
- Correlating informed judgments on a topic spanning a wide range of disciplines; and
- Educating a respondent group as to the diverse and interrelated aspects of a topic.

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[2] Turoff, P. 149

The Delphi approach has certain similarities to decision making by comittee. In both techniques a small group of experts attempts to reach a consensus on important policy issues. However, proponents of the Delphi method suggest that it has certain advantages over decision by committee. For example, an outspoken personality cannot dominate a Delphi exercise as he/she can a committee meeting. In addition, respondents may be less hesitant to criticize opposing views in a Delphi exercise since anonymity is usually guaranteed. Similarly, since respondents do not meet face to face, an individual may be less reluctant to abandon one position to support a second, based on feedback of new evidence.

Use of the Delphi technique was pioneered in the early 1960's by researchers involved in technological forecasting. The earliest exercises asked respondents to predict when technological changes may take place and the impact of the changes. Since that time, the Delphi methodology has become an accepted analytical tool in diverse technological and policy areas.

DESCRIPTION OF THE DELPHI METHODOLOGY

A Delphi exercise was not an original component of this study's research design. The Delphi was proposed in response to a change in study scope early in the project. The Government Request for Proposal called for a project that would design and field test a cost-benefit model applicable to a national study of vocational education. Consistent with the model development strategy discussed earlier, the study Advisory Committee noted that the field testing of an operational model was premature until a careful analysis was made of the feasibility of building and implementing such a model. Therefore, the study orientation changed from field testing a model to assessing the feasibility of a model. One tool proposed to assess this feasibility was a Delphi analysis.

The Delphi methodology is not a substitute for careful analysis. Rather, it should be one component of a thorough analysis plan. Therefore, the Delphi exercise is just one of several methods employed by this project to assess the feasibility of performing a national cost-benefit analysis of vocational education. Other equally important factors are an evaluation of the state of the art in cost-benefit analysis and a rigorous review of potential measurement problems that was based on an extensive literature survey and informal conversations with technical experts.

The fact that the Delphi analysis was not an original part of the research design but a response to a change in study scope affected the size of the respondent group. In order to maintain the established project schedule, the number of respondents was limited to nine, the maximum number allowable without undergoing the time consuming process of obtaining Office of Management and Budget (OMB) approval of the survey instruments and design. The respondent group was made up of all members of the project's Technical Advisory Committee, one member of the agency sponsoring the research (the Office of Vocational and Adult Education), and two representatives of state Departments of Vocational Education. All members of the Delphi panel were experts in vocational education and/or cost-benefit analysis. The names of the Delphi panelists are included in this report as Appendix A.

The Delphi exercise ran for three rounds. The first two rounds consisted of a mail survey. Due to time limitations, the third round was scheduled as a conference at Rehab Corporate headquarters.

Panelists were given approximately 9 days to respond to the mailed questionnaires. Seven of the nine panelists responded to the first round and all panelists submitted round two questionnaires. The Delphi design team utilized one week to feedback the results of round one to the respondents and to structure and mail the second round questionnaire. An additional week was used to plan for the third round conference. The entire Delphi process, from the first mailing to the third round conference, took just over six weeks. This does not include the considerable time spent planning and designing the exercise in advance of the round one mailing. Prior to both mailings, all questions and instructions were pretested on co-workers of the Delphi design team.

The mailing package for rounds one and two consisted of a cover letter, an explanation of the evaluation system used in the survey, and two copies of the questionnaire. The explanation of the evaluation system and the round one and two questionnaires are exhibited in Appendix B.

The reasons for the duplicate questionnaire were threefold. First, it could assist a panelist in planning his responses. Second, it could be used as a record of a panelist's responses which later could be compared to those of the overall group. Third, after planning one's responses, the answers could be typed onto the second questionnaire in order to help assure the anonymity of respondents.

The questions in all rounds were divided into three categories. These categories were:

- The general design of a national cost-benefit study of vocational education
- Measurement issues and problems
- Data availability

However, the response mode differed for each round. In round one, panelists were instructed to evaluate each response option to a question according to a desirability scale (very desirable, desirable, undesirable, and very undesirable) and a feasibility scale (definitely feasible, possibly feasible, possibly infeasible, definitely infeasible). Note that no neutral answer was available on the response scales. Each of the descriptors of desirability and feasibility was followed by a brief explanation or definition. The explanations are shown in Table 3.1. These explanations help establish comparability among responses even though the definitions may not be universally agreeable.

In round two, panelists were asked to rank the desirability of each response option in order of personal preference. No ties were permitted between response options. Round two also included one series of open-ended questions. It allowed respondents to suggest important additional issues and questions in designing a national cost-benefit study of vocational education that may have been overlooked by the design team. These questions asked respondents to:

- List two major obstacles in performing a national cost-benefit analysis of vocational education.
- Describe a strategy for overcoming, minimizing, or dealing with each specified obstacle.
- Suggest two questions that should be addressed by a research team in designing a national cost-benefit analysis of vocational education.

Table 3.1. An Explanation of the Evaluation System Used in the Delphi Questionnaires

DESIRABILITY (EFFECTIVENESS OR BENEFITS) RESPONSE SCALE

DESCRIPTOR	EXPLANATION
Very Desirable	will have a positive effect and little or no negative effect; extremely beneficial; justifiable on its own merit.
Desirable	will have a positive effect, negative effects are minor; beneficial; justifiable as a by-product or in conjunction with other items.
Undesirable	will have a negative effect; harmful; may be justified only as a by-product of a very desirable item, not justified as a by-product of a desirable item.
Very Undesirable	will have a major negative effect; extremely harmful; not justifiable.

FEASIBILITY (PRACTICALITY) RESPONSE SCALE

DESCRIPTOR	EXPLANATION
Definitely Feasible	no hindrance to implementation; no political roadblocks; acceptable to the public.
Possibly Feasible	some indication this is implementable; further consideration or preparation must be given to political or public reaction.
Possibly Infeasible	some indication that this is unworkable; siginificant unanswered questions.
Definitely Infeasible	all indications are negative; unworkable; cannot be implemented.

In the instructions accompanying the first and second round questionnaires, respondents were encouraged to justify their responses, express opinions, rewrite questions, or suggest new questions. The instruction sheet explained that the questionnaire was "meant to be a stimulus for thought on the feasibility of performing a national cost-benefit analysis of vocational education." To facilitate and encourage comments, the questionnaire was laid out so that the right hand page opposite each question was blank with room for commentary. The responses to and comments on all questions in rounds one and two are summarized in Appendix C. A transcript of the round three conference has been submitted under separate cover.

Many of the issues for the third round conference were developed from panelists' responses to the round two open-ended questions that asked for lists of potential obstacles facing a national cost-benefit study team, strategies to overcome the obstacles, and additional questions that must be addressed in designing a national study. Responses to these third round questions were solicited in the format of a round-table panel discussion. Respondents were encouraged to express their views on each issue but were not required to participate in every aspect of the discussion.

The third round of the Delphi exercise was plagued by the three major problems. First, the study team was reluctant to bring the panelists together for a face to face meeting. Although this was deemed an appropriate mechanism to summarize the issues debated in rounds one and two, it threatened the anonymity that had been established in the exercise. Nevertheless, the meeting was scheduled as a concession to project time constraints. Second, it was difficult to arrange a conference date that was amenable to all nine panelists. Six of the nine participants committed themselves to attend the meeting on the date selected. Third, various last minute factors, including the air traffic controllers strike, forced a number of committed respondents to miss the meeting. Anticipating the possible effects of the air traffic controllers strike, the study team decided to invite additional technical experts to the meeting. A total of six people attended the third round conference. However, only two of them had served as panelists for the earlier rounds. A list of conference attendees is included as Appendix D. The conference agenda is shown in Appendix E.

As a result of the turnover in panelists, the conference functioned more as a fact finding meeting than as the third round of the Delphi exercise. Nevertheless, the meeting produced numerous contributions to assessing the feasibility of a national study.

DELPHI RESULTS

Section 2 specified several general characteristics of a cost-benefit model for a national study of vocational education. This sub-section reports the criticisms of a nine member Delphi panel on many of these characteristics.

The Delphi analysis solicited responses from the panel of experts on the desirability and feasibility of several design, measurement, and data base options. The panelists are all recognized experts in vocational education and/or cost-benefit analysis. However, their opinions must not be interpreted as necessarily representative of the vocational education community at large. As is often the case in a Delphi analysis, the size of the panel and the method of panel selection mitigates against the generalizibility of the results. Readers should, therefore, recognize the limitations in these opinions. The limitations in the methodology were accepted a priori by the study team. This is why the Delphi survey was designed as but one of a series of components in assessing the feasibility of conducting a national study.

Results on General Study Design

As Section 2 indicated, potential users of a cost-benefit model should have input into its design at various stages of the development process. Therefore, identification of user groups will have a significant impact on the ultimate specification of the model. The Delphi panelists ranked state agencies closely followed by the Federal Government as the potential user groups most in need of the information that could be generated from a national cost-benefit model of vocational education. It is apparent from some of the comments made by panelists that the current political and economic environment influenced their rankings of potential user groups. Respondents who selected state and local governments cited their increased information needs based on the prospective growth in block grants. The choice of the Federal Government was defended because of the need to make efficient budgetary decisions during a period of spending cuts.

A second design issue examined in the Delphi is determining the optimal breadth of the proposed model. Nearly all respondents indicated through their comments that they are aware of the diversity of the vocational education enterprise. Given this diversity, the respondents were asked to choose between implementing a broad and versatile model that would provide meaningful results to many or all potential users and on varied programs; a series of models that would separately address the information needs of different users and the characteristics of different programs; or a compact model that would focus on a single user, program area, program level, or delivery system. The panel favored the construction of several unique models. They also felt this type of model construction was the most feasible alternative. Interestingly, although the panelists rated a series of compact models first, they alternatively preferred a broad and versatile model to a single compact model. Apparently, they feel that it is necessary to generate information on various elements of vocational education even if it means a trade off in the specificity of the model.

It is important to realize that the issue raised in this question concerns determining the characteristics of the model to be implemented, not the characteristics of the model to be designed. According to the strategy for model development presented earlier, it is necessary to design a theoretically complete global model. From that model, an operational global model and a series of operational sub-models may be constructed. A study team, in consultation with potential user groups, may select which operational sub-models should be implemented. This model design process is summarized quite well by one of the Delphi respondents:

> A broad general model can be used as a starting point for specifications to meet particular needs and interests. Moreover, construction of a narrowly focused model may be better achieved by specification of a general one (top down) than by ad hoc construction (bottom up).

Three factors that could conceivably effect the breadth of the model design are the current availability of data, the level of available resources, and model construct capabilities. The Delphi panel clearly concluded that in an ideal situation, cost considerations and current availability of data should be subordinate to model construct capabilities in designing a cost-benefit study. However, data and funding limitations are a realistic concern. One respondent's comments summarize these viewpoints:

> Given that 1) current data availability and potential resources for the study pose severe programmatic constraints, and 2) the quality of study activities and findings are dependent upon a solid, comprehensive model design, the consideration of model construct capabilities are paramount. Of course the delimiting factors cited in point 1 (data and resource availability) will necessitate flexibility in the development of the model.

Should cost considerations dictate narrowing the scope of the study to one particular education level, the panelists favored examining secondary vocational education first, postsecondary vocational education second, and adult vocational education a distant third. The Delphi respondents clearly rejected the option of an aggregated examination of secondary, postsecondary, and adult vocational programs as a cost-saving alternative. In the words of one panelist:

> The types of benefits differ considerably by institutional level. For example, while job placement rates and earning levels might be the most appropriate benefit measures for postsecondary and adult programs, the benefit of secondary programs might be most appropriately judged by levels of skill proficiency or attitudinal changes. Consequently, I do not see how an aggregate benefit assessment across institutional levels could be fairly constructed.

Under ideal conditions, respondents feel that the most informative study should include and distinguish between the various program levels of vocational education. They similarly believe that the potentially differing efficiencies among vocational program types and delivery systems should be analyzed as part of a national cost-benefit study. Concerning vocational program types, respondents indicated a desire to distinguish between the returns of specific programs within broad program areas. However, they assessed this distinction as potentially unworkable and, therefore, infeasible. Thus, distinctions between programs may have to be made between broad program areas only.

Results on Measurement Issues

The model specified in Section 2 broke vocational education benefits into two categories: economic benefits, which can be measured by annual income, and non-pecuniary benefits. Based on various respondent comments, non-pecuniary benefits appear to be the most difficult aspect of the study design to handle. Clearly, panelists feel that they should be a component of the study. Interestingly, although there is great concern over how to incorporate non-pecuniary benefits into the analysis, and strong criticisms aimed at cost-benefit analysis for its inability to reflect these benefits, the consensus of the panel is that such incorporation in some form is feasible. Apparently, this viewpoint is based on the increased attempts to operationalize non-pecuniary costs and benefits in existing cost-benefit studies. As one panelist comments, "Multi-criterion benefit-cost models are beginning to emerge and should be looked into."

A second issue raised in the model specification was how to treat joint costs. Joint costs are costs incurred when an educational input, such as a piece of equipment or school building, is used by more than one student group. Allocation of the joint costs presents a difficult measurement problem. Several treatment options exist, including excluding them from analysis, evaluating the marginal cost of their use, evaluating the average cost of their use, and evaluating them using game theory. Average cost of use was the most desirable method of evaluating joint costs to the panelists, with marginal cost of use a close second. Since marginal and average cost methods may be relevant in different situations, an optimal alternative might be to use both costing techniques. One panelist, using similar logic, called for the judicious use of average costing, marginal costing, and game theory in a cost benefit analysis:

> For starting a new added program, marginal costs may be the best; for evaluating a whole system, average cost is attractive; game theory methods are relevant when considering several different added programs or combinations thereof.

A third component of the model specified in the previous section was a discount rate. Utilizing a discount rate in cost-benefit analysis permits the evaluator to equate future income with present values. The panelists favored using the rate of inflation as the means of measuring the discount rate. This option was more desirable than either the prime rate of interest or the rate of interest on government treasury bills. Surprisingly, the overall second choice of the Delphi panelists was to exclude a discount rate from the study. However, there was extreme polarization on this response category.

As specified in the model, a student may be enrolled in vocational education both for investment and consumption reasons. Some critics have contended that it is unreasonable to support expensive vocational programs on the basis of non-investment benefits when non-vocational education programs are being underfunded. Panelists, however, supported the presence of consumption benefits in the model. Nevertheless, they rated the feasibility of accurately measuring the level of consumption benefits as quite low.

A vocational education graduate's increased earnings will have a ripple effect throughout the economy, as he/she spends money and increases someone else's income. This was termed an earnings multiplier effect in the model specification. The panelists judged that this earnings multiplier effect should be considered in a cost-benefit study. They did recognize, however, that consideration, while desirable, is somewhat less feasible because of its measurement difficulty.

The opportunity cost of attending a vocational education program may enter into a cost-benefit model as one of the largest cost components. The panelists concurred that use of foregone income as a measure of the opportunity costs of attending school was desirable and relatively feasible. The proxy for foregone income deemed most desirable was the average earnings of individuals with similar characteristics who are not attending school.

The model specification sub-section also suggested that social costs and benefits may diverge from private costs and benefits. Therefore, determination of which entity is the proper basis for a cost-benefit analysis will impact the study results. Panelists indicated that measurement of both private and social costs and benefits are desirable and feasible in a national study.

Another model specification issue that will have serious implications on the succeeding analysis is the choice of a comparison group. Concerning secondary vocational education, respondents concluded that the most logical comparison group was students in a general education program. However, the panelists were somewhat temperate in their support of this option in that comparisons with other alternatives were ranked just below general education programs. These included students attending a college preparatory program, individuals not attending secondary school, and a weighted average of all three activities. For all comparison formats, panelists raised definitional and data availability problems in measurement.

Panelists were evenly divided between students in two year general curriculum colleges and individuals not attending postsecondary schools in their choice of an optimal comparison group for postsecondary vocational education. Regardless of the level of education analyzed or the choice of comparison group, it is important to attempt to control for differences on non-educational variables between groups.

In an effort to distinguish between program enrollees and individual course takers, respondents supported "enrollment in a fixed series of related vocational classes" as a superior definition of a program participant for the model. Further, they agreed that full time equivalent (FTE) students was a more suitable method for counting students than either ADA, ADM, or the average of ADA and ADM. An alternative measurement format was suggested by one panelist:

> FTE is an excellent measure of load on the system. However, seriousness of participants is measured by average daily attendance. I suggest (as an alternative) the measure:
>
> (Number of hours per week) X (Number of enrollees) X R
>
> where R is a reduction factor to account for absentees. R should probably not be linear.

One final factor examined in the Delphi that could impact on the results of a cost-benefit study is the treatment (and possible weighting) of differences in program quality. Measuring differences in the quality of vocational programs was judged to be highly desirable yet possibly infeasible by the majority of panelists. Panelists emphasized the need for delicacy in program quality measurement criteria, noting the potential political impact of such measures.

Results on Data Availability

There are several sources of data that could be used in a national cost-benefit study of vocational education. Delphi panelists specified that utilizing existing data bases supplemented by some new data collection was the preferable strategy for securing data in a national study. This option was preferred to relying solely on existing data bases or conducting a data collection survey exclusively for the national study.

Respondents were also queried on the desirability and feasibility of using a number of different existing sources as the basis for the national study's data. These sources were:

- National Center for Education Statistics' (NCES) Vocational Education Data System (VEDS)
- Bureau of Occupational and Adult Education's (BOAE) Statistical Reports (1973-1978)
- NCES' High School and Beyond Longitudinal Survey (1980)
- Department of Labor's (DOL) National Longitudinal Survey (1979)
- NCES' National Longitudinal Survey of the High School Class of 1972
- National Institute of Education's (NIE) Survey of Vocational Schools in Ten States (1980)
- NCES' Survey of Non-collegiate Postsecondary Students and Schools (1972-1980)
- Assistant Secretary for Planning and Evaluation's (ASPE) Survey of Vocational Education Students and Teachers (1972)
- Office of Civil Rights' (OCR) Survey of Vocational Education Schools (1979)
- Office of Education's (OE) "437 Files" (Grants and Expenditures under State Administered Programs)

- Census Bureau's Current Population Survey Supplement
- Project Talent Data Base
- NCES' Survey of Course Offerings and Enrollments (1973)
- Survey Research Center's Youth in Transition Data Base (1966)

No sound conclusions were made by the Delphi panel about the desirability or feasibility of using these various sources. Rather, many respondents expressed uncertainty about the contents of the alternative data bases. It is interesting to note, however, that of the four respondents knowledgable about VEDS, two rated the data source undesirable. VEDS has come under sharp attack by many in the field for being duplicative and unnecessary.

SECTION 4

RECOMMENDATIONS

FEASIBILITY OF PERFORMING A NATIONAL STUDY

The results of the state of the art review, assessment of potential measurement problems, and Delphi analysis suggest that a national cost-benefit study of vocational education is technically feasible. However, this assessment must be viewed in terms of the current level of sophistication in relating costs and benefits.

Cost-benefit analysis, based on existing technologies, is an imperfect analytical tool. Not all theoretically appropriate variables in a cost-benefit model may be operationalized. Other variables may be operationalized but only by using imprecise proxy variables. Consequently, in most cost-benefit analyses dealing with social issues, there is a significant deviation between the theoretically complete global model and the operational global model. Nevertheless, most modeling, measurement, and data obstacles can be overcome to the point where the product of a cost-benefit analysis is useful and reliable.

One of the companion reports in this study, Design of a National Cost-Benefit Study of Vocational Education at the Secondary, Postsecondary, and Adult Levels: State of the Art Report, illustrates that a large number of cost-benefit analyses of vocational education have been conducted on a sub-national level. Although the logistics of a national study will be substantially more imposing than those on a sub-national basis, they both must confront many of the same technical obstacles. The smaller studies have proven that these limitations can be surmounted. They also demonstrate that a cost-benefit study can contribute to the understanding of vocational education.

A national study faces numerous unique difficulties as well. Many of these problems are addressed in the last sub-section on the recommendations for a national cost-benefit study. These problems must be given careful attention by a national cost-benefit study team. Again, however, they are not fatal to executing a national study.

UTILITY OF PERFORMING A NATIONAL STUDY

A national study of the costs and benefits of vocational education should not be implemented solely based on its technical feasibility. In addition, the utility of a national study must be assessed prior to committing scarce revenues to the research. The utility of performing a national study is considered in this sub-section.

A national cost-benefit study should prove useful for a number of reasons. For example, cost-benefit analysis of vocational education can contribute to sounder policy decisions. The results of a cost-benefit analysis, even if based on an imperfect model, can lead to superior decisions than those based merely on subjective judgment.

Second, the results can be used on the sub-national as well as national level. With the prospect of increased block grants in education, state and local agencies need more information on the relationship between program costs and benefits in order to help make good policy decisions. Given scarce resources, the relationship between costs and benefits is a rational basis on which to make such decisions. Therefore, a national study can contribute to more informed decision-making at the state and local levels.

Third, in the process of building a theoretical model of the costs and benefits of vocational education, a study team can help pinpoint crucial data needs. That is, in an effort to operationalize the model, the study team must assess which data are available, which are reliable, and which are duplicative. This identification process can potentially contribute to reducing the data burden that currently exists in vocational education.

Fourth, the results of a national cost-benefit study will complement existing evaluative research on vocational education. In particular, the national study will be a useful adjunct to the research conducted by the Congressionally mandated NIE Vocational Education Study. The information generated by the two studies will produce a wealth of data on the present state of vocational education.

As with any analytical technique, there is the possibility that the results of a cost-benefit analysis can be misused. For example, some may treat the results of such an analysis as a magic formula that can conclusively allocate scarce funds among alternative programs. The methodological limitations inherent in the technique are too great to base such decisions solely on the results of a cost-benefit analysis. Nevertheless, cost-benefit analysis can provide significant input into making such policy decisions. That is, when used as one component in a multi-criteria policy evaluation, rather than indiscriminately, cost-benefit analysis can be an informative policy-relevant tool.

RECOMMENDATIONS FOR A NATIONAL COST-BENEFIT STUDY

This sub-section presents recommendations for consideration in planning a national cost-benefit study of vocational education. These recommendations pertain to funding limitations, user groups, data problems, modeling considerations, and measurement problems.

Funding Limitations

As a result of Federal efforts to balance the budget, revenues for program evaluation are becoming scarce. Ironically, program evaluation methodologies can help policy makers allocate scarce dollars more intelligently. Given the current fiscal environment, implementing a global operational model, although the optimal choice in designing a national cost-benefit analysis of vocational education, is improbable. Therefore, a hierarchy of sub-models must be created and the sub-models implemented subject to available funding. Given present funding limitations, the following recommendations are made:

- The cost-benefit study should not be conducted on a national basis, but rather, with national considerations. Therefore, a sampling plan must be developed that represents the many diverse characteristics of the vocational education enterprise.

- If a choice must be made among program levels, the first priority should be an analysis of secondary vocational education. This is because secondary vocational education has a higher enrollment, utilizes more revenues, and probably has more thorough and accessible data than postsecondary or adult vocational education.
- Since a national study will be Federally funded, the analysis must first serve Federal policy determination needs. It is preferable, however, for the study to meet the needs of more diverse users.
- If a national study cannot be funded, a less costly alternative might be to provide technical assistance to the states to help them develop the skills to conduct their own cost-benefit analyses. With the prospective advent of block grants, this investment in capacity building on the state level should prove beneficial.

User Groups

Information from a national cost-benefit study can be used by diverse groups, including the Federal Government, state agencies, local agencies, parents and students, and special needs populations. The following recommendations are made concerning user groups:

- If funding levels permit, at a minimum the study should be designed to fulfill the needs of both the Federal Government and state agencies. The information needs of state agencies will be increasing given the current fiscal and political environment.
- Given existing set-aside requirements for special populations, the study should attempt to serve the needs of state and Federal special education program administrators in the area of vocational education.
- In order to increase the acceptance of the study by potential users, user groups should have substantial input into the design of the cost-benefit model.

Data Problems

Disparities in the availability and quality of data among states is a serious obstacle to performing a national cost-benefit study. The following recommendations address these and various other data problems:

- Since it has been proposed that a national study be conducted on a sample basis, the sampling plan should reflect an awareness of data availability and data quality disparities. If possible, states should be included in the sample only if they have available:
    - data on program costs
    - data on student employment and wage histories
    - reliable enrollment data
    - enrollment data sensitive to differences in duration and exposure
    - student follow-up data
    - data files that are updated regularly
- Accurate definitions of various data types must be created. The study team must be sensitive to possible inconsistencies in definitions between states.
- The study should utilize existing data wherever possible and only supplement these data with new data collection if necessary. New data collection should be kept to a minimum given the current attitude at the state and local level that too much duplicative and unimportant data are already demanded.
- One task in the national study can be identifying unreliable and duplicative data elements that are collected through national reporting mechanisms, particularly VEDS which is the newest and perhaps most criticized mechanism. This information could be gathered as a by-product of scrutinizing national data sources for possible use in the cost-benefit analysis.
- A parallel study should be funded that utilizes the results of the previous task and formulates strategies to reduce the data reporting burden faced by states and localities. These strategies might include:
    - creating a vocational education management information system (MIS) to process available data more efficiently
    - adding or deleting data types in statutory reporting systems
    - standardizing acceptable surrogates of unavailable or unreliable data
    - standardizing data definitions
    - standardizing data reporting requirements

Cooperation with the cost-benefit study team and, therefore, acceptance of the study findings may increase if user groups are shown that the research will help reduce their data reporting burden.

Modeling Considerations

For cost-benefit research to be most valuable, a strong commitment must be made to a thorough model development process. Very often, knowledge gained from the modeling process is as significant as the actual results of a cost-benefit study. The following recommendations are made pertaining to model development:

- To maximize the acceptance of the model, the model building process must be fully documented.
- A national cost-benefit study should be required to include specification of a theoretically complete global model, creation of an operational global model and sub-models, model simulation, model field testing, implementation, and evaluation.

To best execute this comprehensive process, it may be preferable to fund a series of consecutive studies, each performing one or more steps in the modeling process, rather than one major study.

Measurement Problems

There are numerous obstacles to measuring accurately the costs and benefits of vocational education in a national cost-benefit study. However, many of these obstacles can be overcome or their effects acceptably minimized by a knowledgable model building team. A number of recommendations are made concerning measurement issues:

- Multiple analytical methods should be employed to assess the relationship between vocational education costs and benefits. This is because alternative analytical approaches can produce varying results under certain conditions.

- The study must include both monetary and non-pecuniary costs and benefits in its design. Although measurement of the latter is difficult, there are numerous acceptable proxy variables that represent non-pecuniary costs and benefits. A model that dismisses non-pecuniary costs and benefits with the disclaimer that "since they can't be measured, they will be omitted" is seriously deficient.
- In a cost-benefit model of vocational education, both private and social costs and benefits must be calculated.
- Since each may be appropriate in different situations, both average cost and marginal cost methods should be included in the analysis.
- The cost-benefit study team should attempt to incorporate game theory in allocating joint costs. The assumption that allocating joint costs is not a problem for the study since the marginal costs are zero, is not appropriate under all conditions, such as in allocating costs among ongoing programs.
- Because of the breadth of vocational education, overaggregated data collection and analysis must be avoided. A cost-benefit analysis must recognize the potentially varying efficiencies of vocational education by program level, program area, delivery system, and student population group.
- It is feasible to include in the cost-benefit model a rate that discounts future benefits to present values and the opportunity costs of participating in vocational programs (measured, for example, by foregone income).
- Model builders should investigate the possibility of including in the model consumption benefits, an earnings multiplier effect, and a control for differences in the quality of vocational programs. Including these factors may not be feasible. However, their omission from the model is not fatal.

APPENDIX A

LIST OF DELPHI PANELISTS

DELPHI PANEL MEMBERS

Dr. Kern Alexander
Director
Institute for Educational Finance
University of Florida
Gainesville, Florida

Mr. Don K. Gentry
State Director of Vocational Education
Indianapolis, Indiana

Dr. George Hagerty
Advocate for Vocational Career Education
Division of Personnel Preparation
U.S. Department of Education
Washington, D.C.

Dr. Charles Hopkins
Oklahoma Department of Vocational Education
Stillwater, Oklahoma

Dr. Jin Eun Kim
Assistant Professor of Educational Administration
School of Education
Catholic University of America
Washington, D.C.

Dr. Gary Meers
Director, Special Vocational Needs
The Center for Vocational Teacher Education
University of Nebraska
Lincoln, Nebraska

Dr. L. Allen Phelps
Assistant Professor
Department of Vocational and Technical Education
University of Illinois
Urbana-Champaign, Illinois

Dr. Robert Thrall
Professor and Chairman
Department of Mathematical Sciences
Rice University
Houston, Texas

APPENDIX B
DELPHI SURVEY PACKAGE

Explanation of the Evaluation System for Round One
Round One Questionnaire
Round Two Questionnaire

EXPLANATION OF EVALUATION SYSTEM

The following evaluation system will be used throughout the exercise to provide possible expressions of judgment. Please keep the following guidelines in mind when responding to each question or using the descriptors in a comment. This is important in establishing comparability among responses even though the definitions may not be universally agreeable.

DESIRABILITY (Effectiveness or benefits)		
4	Very Desirable	will have a positive effect and little or no negative effect; extremely beneficial; justifiable on its own merit.
3	Desirable	will have a positive effect, negative effects are minor; beneficial; justifiable as a by-product or in conjunction with other items.
2	Undesirable	will have a negative effect; harmful; may be justified only as a by-product of a very desirable item, not justified as a by-product of a desirable item.
1	Very Undesirable	will have a major negative effect; extremely harmful; not justifiable.

FEASIBILITY (Practicality)		
4	Definitely Feasible	no hindrance to implementation; no political roadblocks; acceptable to the public.
3	Possibly Feasible	some indication this is implementable; further consideration or preparation must be given to political or public reaction.
2	Possibly Infeasible	some indication that this is unworkable; significant unanswered questions.
1	Definitely Infeasible	all indications are negative; unworkable; cannot be implemented.

DELPHI QUESTIONNAIRE

ROUND 1

for the

Design of a National Cost-Benefit
Study of Vocational Education
at the Secondary, Postsecondary,
and Adult Levels

Rehab Group, Inc.
5827 Columbia Pike
Falls Church, Virginia 22041

June 26, 1981

INSTRUCTIONS FOR DELPHI PANELISTS

(1) Enclosed are two copies of the Delphi questionnaire. Return only one in the enclosed stamped and preaddressed envelope. The second is for reference and to assist you in preparing your response.

(2) Please mail your response on or before July 7.

(3) The questionnaire is divided into three sections:

- Questions on the general design of a cost-benefit study of vocational education
- Questions concerning measurement issues and problems
- Questions on data availability

For each question, you are to evaluate the desirability and/or feasibility of every response according to an evaluation system. This evaluation system is explained on a separate sheet so that you can refer to it easily throughout the exercise. Be sure that you evaluate every response; do not merely select the one response that is most agreeable to you.

(4) You are encouraged to write justifications for your answers and general comments on the issues discussed in each question. Such comments are an important part of the information collection process. The amount of information gained from the Delphi exercise is dependent upon each respondent writing relevant comments on the questions. These comments will be made available to other panelists before they respond to the second round questionnaire. Anonymity will be maintained in all cases. The right hand page opposite each question is blank so that you can easily write your comments. Feel free to attach additional sheets, if necessary.

(5) Questions in this Delphi exercise are meant to be a stimulus for thought on the feasibility of performing a national cost-benefit analysis of vocational education. You should not feel constrained by the questions. In fact, you have the following options on any question:

- Rewrite the question and answer your version if you feel the original is misleading or inappropriate.
- Suggest questions you would like to see in the next round of the exercise that you feel will clarify an issue or raise a new alternative that the Delphi panelists should consider.
- Write comments that relate to the question or that clarify your response to the question.

(6) In subsequent rounds, additional questions will be developed that attempt to highlight reasons why polarization of viewpoints occurred on some issues. Also, new questions will be added or old questions reworded to clarify viewpoints. Therefore, the Delphi process is a cumulative one.

(7) Thank you again for your commitment to this exercise. We look forward to your response. If you have any questions, feel free to call Dr. Mark Shugoll or Mr. Tim Helms collect at (703) 820-4350.

I. QUESTIONS ON GENERAL STUDY DESIGN

The following questions deal with general issues in the design of a national cost-benefit study of vocational education.

1. A national cost-benefit study of vocational education must be designed to meet the needs of its users. Please evaluate the desirability and feasibility of designing a study which would yield information to meet the needs of the following user groups:

	Desirability	Feasibility
- Individuals, whose needs might include determining whether vocational training will result in increased future benefits		
- Educational institutions, whose needs might include making efficient investment decisions		
- Local education agencies, whose needs might include making program decisions based on local manpower needs		
- State education agencies, whose needs might include determining how to distribute educational revenues to maximize educational output		
- Federal Government, whose needs might include allocating scarce resources among alternative programs		
- Other (please specify)		

COMMENTS

1.

2. Please evaluate the desirability and feasibility of each of the following possibilities in designing a national cost-benefit study of vocational education:

	Desirability	Feasibility
- Narrow the focus of the study to a single user and construct a compact model		
- Develop a broad and versatile model that would provide results that are meaningful to many or all potential users		
- Construct several models that separately address the information needs of different users		

3. Please evaluate the desirability of each of the following considerations in designing a national cost-benefit study of vocational education:

	Desirability
- Study design should be dictated by the current availability of data	
- Study design should be dictated by model construct capabilities	
- Study design should be dictated by cost considerations	

COMMENTS

2.

3.

4. The scope of a national cost-benefit evaluation is of particular concern. The larger the scope, the more generalizable are the results. However, the larger the scope, the less specific are the results concerning educational level and program area.

a. Please evaluate the desirability and feasibility of conducting a national cost-benefit study of the following educational levels:

	Desirability	Feasibility
- An aggregation of secondary, postsecondary, and adult vocational education programs		
- An examination of secondary vocational education programs only		
- An examination of postsecondary vocational education programs only		
- An examination of adult vocational education programs only		

b. For any given educational level, please evaluate the desirability and feasibility of conducting a national cost-benefit study which:

	Desirability	Feasibility
- Does not distinguish among program areas or specific programs		
- Distinguishes among broad program areas only		
- Distinguishes among specific programs within broad program areas		

c. For any given educational level and program area, please evaluate the desirability and feasibility of conducting a national cost-benefit study which distinguishes between the type of institution in which the training is received (e.g., community colleges, technical institutes, proprietary schools, on the job training, etc.):

Desirability	Feasibility

COMMENTS

4. a.

b.

c.

II. QUESTIONS ON MEASUREMENT ISSUES

Numerous measurement problems will confront a study team performing a national cost-benefit analysis of vocational education. The following questions present some of the concepts that may result in measurement problems.

1. One of the first problems encountered when considering a cost-benefit analysis is to determine who is a vocational education student. Please evaluate the desirability and feasibility of using the following criteria for determining a vocational education program participant:

	Desirability	Feasibility
- Enrollment in at least one vocational class		
- Enrollment in more than one vocational class		
- Enrollment in a fixed series of related vocational classes		
- Other (please specify)		

2. Once an appropriate determination has been made on what determines a vocational education program participant, a suitable method for counting these students needs to be determined. Please evaluate the desirability and feasibility of using the following measures of student participation:

	Desirability	Feasibility
- Average Daily Attendance (ADA)		
- Average Daily Membership (ADM)		
- (ADA + ADM)/2		
- Full-time Equivalent (FTE)		
- Other (please specify)		

COMMENTS

1.

2.

3. The costs and benefits resulting from vocational education need to be compared to those of one or more alternative activities. Those comparison activities may differ by educational level.

   a. Please evaluate the desirability and feasibility of comparing the costs and benefits of secondary vocational education with the costs and benefits of:

	Desirability	Feasibility
- Attending a general education program		
- Attending a college preparatory program		
- Not attending secondary school		
- A weighted average of the three previously mentioned activities		
- Other (please specify)		

   b. Please evaluate the desirability and feasibility of comparing the costs and benefits of postsecondary vocational education with the costs and benefits of:

	Desirability	Feasibility
- Attending a two-year general curriculum college		
- Attending a four-year general curriculum college		
- Not attending a postsecondary school		
- A weighted average of the three previously mentioned activities		
- Other (please specify)		

COMMENTS

---

3. a.

b.

3. c. Please evaluate the desirability and feasibility of comparing the costs and benefits of adult vocational education with the costs and benefits of:

	Desirability	Feasibility
- Attending a two-year general curriculum college		
- Attending a four-year general curriculum college		
- Not attending school		
- A weighted average of the three previously mentioned activities		
- Other (please specify)		

4. The costs and benefits of vocational education accrue to various individuals and groups. An essential consideration for any cost-benefit calculation is to determine for which entity (i.e. an individual or society as a whole) costs and benefits should be evaluated in a national study. Please rate the desirability and feasibility of evaluating the cost and benefits accruing to the following:

	Desirability	Feasibility
- The vocational education enrollee		
- Society as a whole (including the enrollee)		
- Society exclusive of the vocational enrollee		
- Other (please specify)		

COMMENTS

---

3. c.

4.

5. A discount rate is often utilized in cost benefit analysis to equate future income with present values. Please rate the desirability of using the following measures as a discount rate:

	Desirability
- The prime rate of interest	
- The rate of interest on government treasury bills	
- The rate of inflation	
- Zero (discount rates should not be included in the study)	
- Other (please specify)	

6. The allocation of "joint costs" presents a problem for cost-benefit evaluators. Joint costs occur when an educational input, such as a teacher, piece of equipment, or school building, is used by more than one student group. Please rate the desirability and feasibility of the following treatments of joint cost:

	Desirability	Feasibility
- Exclude from analysis		
- Evaluate the marginal cost of use		
- Evaluate the average cost of use		
- Other (please specify)		

COMMENTS

5.

6.

7. The opportunity cost of attending a vocational education program may enter in as one of the largest cost components in a cost-benefit analysis. An opportunity cost is the income a student would have earned had he/she been working rather than attending school. The appropriate estimator of income foregone may differ by program level. Please rate the desirability and feasibility of the following estimators of foregone income for the secondary, postsecondary, and adult vocational education levels.

a. For secondary vocational education, the appropriate estimator of the opportunity cost of attendance might be:

	Desirability	Feasibility
- Zero, the individual would be attending school anyway		
- The average income of individuals of high school age who are not attending school		
- A weighted average of the two previous measures		
- Other (please specify)		

b. For postsecondary vocational education, the appropriate estimator of the opportunity cost of attendance might be:

	Desirability	Feasibility
- Zero, the student would be attending school anyway		
- The average earnings of individuals of similar characteristics who are not attending school		
- A weighted average of the previous two estimators		
- Other (please specify)		

COMMENTS

7. a.

b.

7. c. For adult vocational education, the appropriate estimator of the opportunity cost of attendance might be:

	Desirability	Feasibility
- Zero, the student would be attending school anyway		
- The average earnings of individuals of similar characteristics who are not attending school		
- A weighted average of the two previous estimators		
- Other (please specify)		

8. Please evaluate the desirability and feasibility of utilizing the following measures of future earnings:

	Desirability	Feasibility
- Gross income (including investments)		
- Annual labor earnings		
- Individual hourly wage rates		
- Other (please specify)		

COMMENTS

7. c.

8.

9. Increased earnings resulting to a vocational education graduate have an economic impact greater than the net increase in the graduates' earnings. This results because a large portion of the increased earnings will typically be spent, increasing the income of another individual. Please rate the desirability and feasibility in a national cost-benefit study of accounting for this earnings multiplier effect.

Desirability	Feasibility

10. Please evaluate the desirability and feasibility of including non-pecuniary costs and benefits in a cost-benefit analysis.

Desirability	Feasibility

COMMENTS

9.

10.

11. Please evaluate the desirability and feasibility of including measures of the differences in quality of vocational programs in a national cost-benefit analysis.

Desirability	Feasibility

12. A student may be enrolled in vocational education for both investment and consumption reasons. It is part investment because a student is investing in "human capital" with the anticipation of future increases in income. It is part consumption since a student is consuming vocational education purely for immediate personal gratification. Evaluate the desirability and feasibility of measuring consumption benefits of vocational education in a cost-benefit study.

Desirability	Feasibility

COMMENTS

11.

12.

III. QUESTIONS ON DATA AVAILABILITY

There are several sources of data that can be used in a national cost-benefit study of vocational education. The following questions consider some of these alternatives.

1. Please evaluate the desirability and feasibility of utilizing the following types of data in a national cost-benefit analysis of vocational education:

	Desirability	Feasibility
- Existing data bases		
- Existing data bases supplemented by survey data		
- Survey data collected exclusively for the cost-benefit study		

2. Please evaluate the desirability and feasibility of using the following data bases in a national cost-benefit study:

	Desirability	Feasibility	Not Familiar With Data Base
- National Center for Educational Statistics' (NCES) Vocational Education Data System (VEDS)			
- Bureau of Occupational and Adult Education's (BOAE) Statistical Reports, 1973-1978			
- NCES' High School and Beyond Longitudinal Survey (1980)			
- Department of Labor's (DOL) National Longitudinal Survey (1979)			
- NCES' National Longitudinal Survey of the High School Class of 1972			
- National Institute of Education's (NIE) Survey of Vocational Schools in Ten States (1980)			

COMMENTS

1.

2.

2. (cont'd.)

	Desirability	Feasibility	Not Familiar With Data Base
- NCES' Survey of Noncollegiate Postsecondary Students and Schools (1972-1980)			
- Assistant Secretary for Planning and Evaluation's (ASPE) Survey of Vocational Education Students and Teachers (1972)			
- Office of Civil Rights' (OCR) Survey of Vocational Education Schools (1979)			
- Office of Education's (OE) "437 Files" (Grants and Expenditures under State Administered Programs)			
- Census Bureau's Current Population Survey Supplement			
- Project Talent Data Base			
- NCES' Survey of Course Offerings and Enrollments (1973)			
- Survey Research Center's Youth in Transition Data Base (1966)			

COMMENTS

2. (cont'd.)

DELPHI QUESTIONNAIRE

ROUND 2

for the

Design of a National Cost-Benefit Study of Vocational Education at the Secondary, Postsecondary, and Adult Levels

Rehab Group, Inc.
5827 Columbia Pike
Falls Church, Virginia 22041

July 17, 1981

INSTRUCTIONS FOR DELPHI PANELISTS

(1) Enclosed are two copies of the Delphi questionnaire. Return only one in the enclosed stamped and preaddressed envelope. The second is for referenece and to assist you in preparing your response.

(2) Please mail your response on or before July 29.

(3) The questionnaire is divided into three sections:

- Section I - Questions on the general design of a cost-benefit study of vocational education.
- Section II - Questions concerning measurement issues and problems.
- Section III - Miscellaneous questions.

For all questions in Sections I and II, please rank the desirability of each response in order of personal preference. Use the number 1 to designate the "most desirable" response, the number 2 to designate the "next most desirable" response, etc., until all responses are ranked. Please break all ties between rankings. Therefore, no two responses should be assigned the same number.

Example: Please rank, in order of preference, the desirability of using the following measures to end the baseball strike:

Ranking

-- Continue present negotiations between both parties ______
-- Send the parties to binding arbitration ______
-- Place all negotiators in a boxing ring with Sugar Ray Leonard ______

Instructions for responding to questions in Section III are included with these questions.

(4) For all questions, please write a brief justification of your response on the right hand page opposite the question. This step is a critical part of the information collection process.

(5) Questions in this Delphi exercise are meant to be a stimulus for thought on the feasibility of performing a national cost-benefit analysis of vocational education. You should not feel constrained by the questions. In fact, you have the following options on any question:

- Rewrite the question and answer your version if you feel the original is misleading or inappropriate.
- Suggest questions you would like to see in the next round of the exercise that you feel will clarify an issue or raise a new alternative that the Delphi panelists should consider.
- Write comments that relate to the question or that clarify your response to the question.

The right hand page opposite each question is blank so that you can easily write your comments. All comments and justifications will be made available to other panelists before the Washington meeting. Anonymity will be maintained in all cases.

(6) Thank you again for your commitment to this exercise. We look forward to your response. If you have any questions, feel free to call Dr. Mark Shugoll or Mr. Tim Helms collect at (703) 820-4350

I. QUESTIONS ON GENERAL STUDY DESIGN

The following questions deal with general issues in the design of a national cost-benefit study of vocational education.

1. A national cost-benefit study of vocational education must be designed to meet the needs of its users. Please rank,in order of preference, the desirability of designing a study which would yield information to meet the needs of the following user groups:

Ranking

-- Individuals, whose needs might include determining whether vocational training will result in increased income, career advancement, or other benefits ______

-- Educational institutions, whose needs might include increasing the efficiency of vocational programs ______

-- Local education agencies, whose needs might include securing efficient investments in vocational programs ______

-- State education agencies, whose needs might include determining how to distribute educational revenues to maximize educational output ______

-- Federal Government, whose needs might include allocating federal funds to the most efficient alternative programs ______

-- Other (please specify) ______

COMMENTS AND JUSTIFICATIONS

1.

2. Please rank, in order of preference, the desirability of each of the following possibilities in designing a national cost-benefit study of vocational education:

	Ranking
-- Narrow the focus of the study to a single user and construct a compact model	______
-- Develop a broad and versatile model that would provide results that are meaningful to many or all potential users and on diverse programs	______
-- Construct several models that separately address the information needs of different users and the characteristics of different programs	______

3. Please rank, in order of preference, the desirability of each of the following considerations in designing a national cost-benefit study of vocational education:

	Ranking
-- Study design should be dictated by the current availability of data	______
-- Study design should be dictated by model construct capabilities	______
-- Study design should be dictated by cost considerations	______

COMMENTS AND JUSTIFICATIONS

2.

3.

4. The scope of a national cost-benefit evaluation is of particular concern. The larger the scope, the more generalizable are the results. However, the larger the scope, the less specific are the results concerning educational level and program area. Please rank, in order of preference, the desirability of conducting a national cost-benefit study of the following educational levels:

Ranking

-- An examination of secondary vocational education programs only ______

-- An examination of postsecondary vocational education programs only ______

-- An examination of adult vocational education programs only ______

-- An aggregated examination of secondary, postsecondary, and adult vocational education programs ______

-- An examination of secondary, postsecondary, and adult vocational education programs with each level analyzed separately ______

COMMENTS AND JUSTIFICATIONS

4.

II. QUESTIONS ON MEASUREMENT ISSUES

Numerous measurement problems will confront a study team performing a national cost-benefit analysis of vocational education. The following questions present some of the concepts that may result in measurement problems.

1. One of the first problems encountered when considering a cost-benefit analysis is to determine who is a vocational education student. Please rank, in order of preference, the desirability of using the following criteria for determining a vocational education program participant:

	Ranking
-- Enrollment in at least one vocational class	______
-- Enrollment in more than one vocational class	______
-- Enrollment in a fixed series of related vocational classes	______
-- A combination of the above three measures	______
-- Other (please specify)	______

2. Once an appropriate determination has been made on what determines a vocational education program participant, a suitable method for counting these students needs to be determined. Please rank, in order of preference, the desirability of using the following measures of student participation:

	Ranking
-- Average Daily Attendance (ADA)	______
-- Average Daily Membership (ADM)	______
-- (ADA + ADM)/2	______
-- Full-time Equivalent (FTE)	______
-- Other (please specify)	______

COMMENTS AND JUSTIFICATIONS

1.

2.

3. The costs and benefits resulting from vocational education need to be compared to those of one or more alternative activities. Those comparison activities may differ by educational level.

   a. Please rank, in order of preference, the desirability of comparing the costs and benefits of secondary vocational education with the costs and benefits of:

	Ranking
-- Attending a general education program	______
-- Attending a college preparatory program	______
-- Not attending secondary school	______
-- A weighted average of the three previously mentioned activities	______
-- Other (please specify)	______

   b. Please rank, in order of preference, the desirability of comparing the costs and benefits of postsecondary vocational education with the costs and benefits of:

	Ranking
-- Attending a two-year general curriculum college	______
-- Attending a four-year general curriculum college	______
-- Not attending a postsecondary school	______
-- A weighted average of the three previously mentioned activities	______
-- Other (please specify)	______

COMMENTS AND JUSTIFICATIONS

3. a.

b.

4. The costs and benefits of vocational education accrue to various individuals and groups. An essential consideration for any cost-benefit calculation is to determine for which entity (i.e. an individual or society as a whole) costs and benefits should be evaluated in a national study. Please rank,in order of preference, the desirability of evaluating the cost and benefits accruing to the following:

Ranking

-- The vocational education enrollee ______
-- Society as a whole (including the enrollee) ______
-- Society exclusive of the vocational enrollee ______
-- Other (please specify) ______

5. The allocation of "joint costs" presents a problem for cost-benefit evaluators. Joint costs occur when an educational input, such as a teacher, piece of equipment, or school building, is used by more than one student group. Please rank,in order of preference, the desirability of the following treatments of joint cost:

Ranking

-- Exclude from analysis ______
-- Evaluate the marginal cost of use ______
-- Evaluate the average cost of use ______
-- Evaluate using game theory ______
-- Other (please specify) ______

COMMENTS AND JUSTIFICATIONS

4.

5.

III. MISCELLANEOUS QUESTIONS

The following questions are designed to allow panelists input in suggesting issues and questions that they feel are important in designing a national cost-benefit study of vocational education.

1. Please list what you consider to be the two major obstacles to performing a national cost-benefit analysis of vocational education:

Obstacle I --

Obstacle II --

COMMENTS AND JUSTIFICATIONS

1.

2. Briefly describe a strategy for overcoming, minimizing, or dealing with each obstacle listed in response to the previous question.

Obstacle I --

Obstacle II --

COMMENTS AND JUSTIFICATIONS

2.

3. Please write two questions that you feel must be addressed by a research team in designing a national cost-benefit analysis of vocational education.

   These questions can deal with measurement problems, study methodology, user groups, data availability, or any other issue of your choice as long as it has not been asked previously in this questionnaire. You do not have to answer the questions.

   Question I --

   Questions II --

COMMENTS AND JUSTIFICATIONS

3.

APPENDIX C

RESULTS OF DELPHI ANALYSIS AND PANELISTS' COMMENTS

ROUND ONE

I. QUESTIONS ON GENERAL STUDY DESIGN

The following questions deal with general issues in the design of a national cost-benefit study of vocational education.

1. A national cost-benefit study of vocational education must be designed to meet the needs of its users. Please evaluate the desirability and feasibility of designing a study which would yield information to meet the needs of the following user groups:

	Desirability				Feasibility				Rating
	4	3	2	1	4	3	2	1	
- Individuals, whose needs might include determining whether vocational training will result in increased future benefits	3	4			2	2	3		N*
- Educational institutions, whose needs might include making efficient investment decisions	5	2			2	5			N
- Local education agencies, whose needs might include making program decisions based on local manpower needs	5	2			1	6			N
- State education agencies, whose needs might include determining how to distribute educational revenues to maximize educational output	6	1			2	5			N
- Federal Government, whose needs might include allocating scarce resources among alternative programs	5	1	1		2	4	1		N
- Special needs populations	1					1			N

---

*N = the number of panelists responding in this category

-- The proposed scale is not fine enough for my taste, so I will use + to indicate halfway between. (STUDY TEAM NOTE -- FOR EASE OF PRESENTATION TO OTHER PANELISTS, A RESPONSE OF 3+ IS TABULATED AS A 3, ETC.)

-- Given the current political climate, it appears certain that local and state agencies will have the most critical policy decisions to make over the next 4-5 years relative to vocational education.

-- The feasibility of designing a cost-benefit system which effectively measures the non-economic benefits of vocational education remains doubtful in my mind.

-- Individuals may be interested in "personal" (private) costs and benefits in either advancing job oportunity or in changing their career.

-- Educational institutions may be interested in "program" costs and benefits in increasing the efficiency of vocational programs; the resulting information will be useful for program evaluation purposes.

-- Local education agencies may be interested in "public" costs and benefits in order to secure public investment in vocational programs.

-- Must avoid duplication.

-- Cost data at the best point of usage should be enough.

-- Considerable effort will have to be made to identify and measure benefits derived from vocational education. Previous studies have been conducted but with little acceptance or agreement among users.

-- Considering the economic conditions which prevail and impact upon educational decision makers, it is imperative that a national cost/benefit study address the needs of all users - from the perspective of the individual through the federal arena. Clearly, the compelling needs of special populations (i.e., handicapped, other traditionally excluded or underepresented minorities) and the efficacy of vocational education in meeting their unique needs should be an area of study. Current studies at the University of Illinois (Kush, 1980) have clearly indicated the monetary and non-monetary benefits of vocational preparation upon some of the most severely handicapped populations.

2. Please evaluate the desirability and feasibility of each of the following possibilities in designing a national cost-benefit study of vocational education:

	Desirability				Feasibility				
	4	3	2	1	4	3	2	1	Rating
- Narrow the focus of the study to a single user and construct a compact model		4	3		2	4	1		N
- Develop a broad and versatile model that would provide results that are meaningful to many or all potential users	3	2	2		2	3	2		N
- Construct several models that separately address the information needs of different users	3	3	1		3	4			N

3. Please evaluate the desirability of each of the following considerations in designing a national cost-benefit study of vocational education:

	Desirability				
	4	3	2	1	Rating
- Study design should be dictated by the current availability of data	1	4	2		N
- Study design should be dictated by model construct capabilities	3	3	1		N
- Study design snould be dictated by cost considerations	1	2	2	1	N

COMMENTS ON SECTION I -- QUESTION 2

-- Would you focus the study efforts to "programs," not to "users" ?

-- Would you attempt to develop an overall framework and submodels for defining sub-components of the general model?

-- By breaking the study into consumer groups, the researchers will gain both depth and breadth in the study.

Example - Handicapped
Disadvantaged
Displaced Homemakers
High school dropouts
Etc.

-- By "several models", I would hope that you are considering 2-4 models that might be focused on type of delivery system, e.g. comprehensive high school, area vocational center, community college.

-- A broad general model can be used as a starting point for specifications to meet particular needs and interests. Moreover, construction of a narrowly focused model may be better achieved by specification of a general one (top down) by ad hoc construction (bottom up).

-- May be justified only as a by-product of a very desirable multi-model design (Option 1.)

-- Low feasibility assessment resulting from the complexity of several interdependent processes/procedures (i.e., instrument development, defining parameters of study workscope and content, and data collection and synthesis) (Option 2).

COMMENTS ON SECTION I -- QUESTION 3

-- These are all important considerations, and they are in obvious conflict. Some trade-offs will be required; I regard none of them as pre-emptive relative to the others.

-- All three factors/considerations should be given equal consideration.

-- Should set the stage for future repeats of study, not get locked into a current situation which might produce bad or unreliable data.

4. The scope of a national cost-benefit evaluation is of particular concern. The larger the scope, the more generalizable are the results. However, the larger the scope, the less specific are the results concerning educational level and program area.

a. Please evaluate the desirability and feasibility of conducting a national cost-benefit study of the following educational levels:

	Desirability				Feasibility				
	4	3	2	1	4	3	2	1	Ratin
- An aggregation of secondary, postsecondary, and adult vocational education programs	3	1	1	1	2	3		1	N
- An examination of secondary vocational education programs only	3	2	1	1	4	2		1	N
- An examination of postsecondary vocational education programs only	3	2	1	1	4	2		1	N
- An examination of adult vocational education programs only	3	2	1	1	4	2		1	N

b. For any given educational level, please evaluate the desirability and feasibility of conducting a national cost-benefit study which:

	Desirability				Feasibility				
	4	3	2	1	4	3	2	1	Ratin
- Does not distinguish among program areas or specific programs		1	3	2	2	2	2		N
- Distinguishes among broad program areas only		5	1	1	2	5			N
- Distinguishes among specific programs within broad program areas	4	2	1	1	1	2	4		N

c. For any given educational level and program area, please evaluate the desirability and feasibility of conducting a national cost-benefit study which distinguishes between the type of institution in which the training is received (e.g., community colleges, technical institutes, proprietary schools, on the job training, etc.):

Desirability				Feasibility				
4	3	2	1	4	3	2	1	Rating
5	1		1	2	4		1	N

COMMENTS ON SECTION I -- QUESTION 4 a.

-- You may conduct a study on costs and benefits of vocational programs by:

(1) school level -- secondary, post-secondary, adult.
(2) scope of area -- institutional basis, local basis, state-wide and/or nationwide study.
(3) program area and/or specific program.

-- If the programs are looked at separately, and then as a part of the total program delivery model, the study will be much stronger.

-- The "aggregation" need not be an "integrated aggregation" although that would be desirable if feasible.

-- Each of the levels should be conducted if an attempt is made.

-- Should be a total - all level - but not aggregated.

-- I would encourage a cross-study analysis of relative cost-benefit measures across several management and program content variables including promising strategies which lead to effective program implementation and efficient distribution/consumption of resources.

COMMENTS ON SECTION I -- QUESTION 4 b.

-- Here is another instance where trade-offs are clearly required. The more one asks for, the harder it is to get.

-- Costs vary considerably in vocational education by specific program area. The costs for a co-op program are minimal when compared to a machine shop program.

-- The data might be easy to secure for the entire area of vocational education but its effectiveness in the field will be greatly dimished.

-- Must be defined and with some understanding among researchers and users of information from study.

COMMENTS ON SECTION I -- QUESTION 4 c.

-- This is a very important component of the study.

-- This is a must to help settle some of the arguments over whether or not secondary vocational education should exist or not.

-- Political problems -- assumes same program quality and many items.

II. QUESTIONS ON MEASUREMENT ISSUES

Numerous measurement problems will confront a study team performing a national cost-benefit analysis of vocational education. The following questions present some of the concepts that may result in measurement problems.

1. One of the first problems encountered when considering a cost-benefit analysis is to determine who is a vocational education student. Please evaluate the desirability and feasibility of using the following criteria for determining a vocational education program participant:

	Desirability				Feasibility				
	4	3	2	1	4	3	2	1	Ratin
- Enrollment in at least one vocational class	3		3		2	3	1		N
- Enrollment in more than one vocational class		2	4		1	4	1		N
- Enrollment in a fixed series of related vocational classes	5	1	1		3	4			N
- Other (please specify)	2				1	1			N

2. Once an appropriate determination has been made on what determines a vocational education program participant, a suitable method for counting these students needs to be determined. Please evaluate the desirability and feasibility of using the following measures of student participation:

	Desirability				Feasibility				
	4	3	2	1	4	3	2	1	Ratin
- Average Daily Attendance (ADA)	1	1	2	1	2	2		1	N
- Average Daily Membership (ADM)		1	3	1	2	2		1	N
- (ADA + ADM)/2	1		3	1	2	1	1	1	N
- Full-time Equivalent (FTE)	2	3	1		2	3			N
- Other (please specify): (Contact Hours)	1					1			N

COMMENTS ON SECTION II -- QUESTION 1

-- The feasibility varies greatly upon which state you are talking about.

-- I visualize a sampling procedure which can establish what % of "at least one" fall in each of the other categories. Then it may be possible to use one detailed measure as a surrogate for all.

-- Should be a vocational program not length of time as a class. Various occupations take different times, comparison will not be easy, but on a cost study should look at the cost of the product produced not just one segment or part of it.

-- Other: specifically designed curriculum.

COMMENTS ON SECTION II -- QUESTION 2

-- Since some funding depends on ADA, it should be measured. Since costs relate to ADM, it also needs measurement and the average seems a good statistic. However, FTE is perhaps a better output measure.

-- The researcher might well want to use a span of time as a determinant. If a student spends 15 hours or over in a vocational class they would be considered full time students.

3. The costs and benefits resulting from vocational education need to be compared to those of one or more alternative activities. Those comparison activities may differ by educational level.

   a. Please evaluate the desirability and feasibility of comparing the costs and benefits of secondary vocational education with the costs and benefits of:

	Desirability				Feasibility				
	4	3	2	1	4	3	2	1	Rating
- Attending a general education program	3	1	1	2	3	1	1	2	N
- Attending a college preparatory program	3	1	1	2	3	1	1	2	N
- Not attending secondary school	3	1	1	2	3		2	2	N
- A weighted average of the three previously mentioned activities	1	1	1	3	1	1	2	2	N
- Those special needs students attending special education programs		1				1			
- Entering an occupation without any training		1				1			N

   b. Please evaluate the desirability and feasibility of comparing the costs and benefits of postsecondary vocational education with the costs and benefits of:

	Desirability				Feasibility				
	4	3	2	1	4	3	2	1	Rating
- Attending a two-year general curriculum college	3	2		2	3	2		2	N
- Attending a four-year general curriculum college	1	2	1	3	1	2	2	2	N
- Not attending a postsecondary school	4		1	2	3	1	1	2	N
- A weighted average of the three previously mentioned activities	1	1	1	3	1	1	2	2	N
- Entering an occupation without any training		1				1			

COMMENTS ON SECTION II -- QUESTION 3 a.

-- The largest problem with both A and B will be the securing of the data, especially for those youth who are out of school.

-- Major definitional problems exist with determination of general and college preparation curriculum students.

-- Here again, the use of a weighted average may provide a good statistic, especially if supported with data on the three alternatives.

-- I don't believe there is any reason to compare with other types of education. They all have different goals and expected outcomes. Maybe compare to training costs in other delivery systems.

-- We should never make a comparison or claim of vocational education vs. other education without consideration of goals of individuals and all the variables that may enter into picture - i.e., aptitude, what if on the same individual. 1 vs. 2 vs. 3, etc.

-- Other: Those special needs (handicapped) students attending special education programs.

COMMENTS ON SECTION II -- QUESTION 3 b.

-- For special needs populations: Potential discussion of the costs and benefits of integrated postsecondary vocational education versus segregated rehabilitation programming.

3. c. Please evaluate the desirability and feasibility of comparing the costs and benefits of adult vocational education with the costs and benefits of:

	Desirability				Feasibility				
	4	3	2	1	4	3	2	1	Rating
- Attending a two-year general curriculum college	1	1	2	3	1	2	1	3	N
- Attending a four-year general curriculum college	1	1	2	3	1	2	1	3	N
- Not attending school	3	1	1	2	2	1	2	2	N
- A weighted average of the three previously mentioned activities	1		3	2	1	1	2	2	N
- Entering an occupation without any training		1				1			N

4. The costs and benefits of vocational education accrue to various individuals and groups. An essential consideration for any cost-benefit calculation is to determine for which entity (i.e. an individual or society as a whole) costs and benefits should be evaluated in a national study. Please rate the desirability and feasibility of evaluating the cost and benefits accruing to the following:

	Desirability				Feasibility				
	4	3	2	1	4	3	2	1	Rating
- The vocational education enrollee	5	1			3	3			N
- Society as a whole (including the enrollee)	4	2			2	4			N
- Society exclusive of the vocational enrollee	3		2	1	2	2		2	N
- Special populations including: rural urban, bilingual and handicapped populations	1				1				N

COMMENTS ON SECTION II -- QUESTION 3 c.

-- Is this at the individual or at the societal level or both?

-- The data for adult vocational students will have to be secured from other sources than those used with Secondary and Postsecondary students. This statement is made because the needs of adults and their motivation for attending is so different.

COMMENTS ON SECTION II -- QUESTION 4

-- Perhaps it will be more broadly or alternately defined in the years ahead, but vocational education, in some form, will continue to exist.

-- Other: Potential for cost/benefit analysis for special populations including rural, urban, bilingual and handicapped populations.

-- I believe the benefit to society should be determined as well as the enrollee, but the costs are a different question. The costs are weights against the benefits.

5. A discount rate is often utilized in cost benefit analysis to equate future income with present values. Please rate the desirability of using the following measures as a discount rate:

	Desirability 4	3	2	1	Rating
- The prime rate of interest		2	4	1	N
- The rate of interest on government treasury bills		1	2	2	N
- The rate of inflation	2	3	1	1	N
- Zero (discount rates should not be included in the study)	1	3		3	N
- Other (please specify) (social discount rate)	1				N

6. The allocation of "joint costs" presents a problem for cost-benefit evaluators. Joint costs occur when an educational input, such as a teacher, piece of equipment, or school building, is used by more than one student group. Please rate the desirability and feasibility of the following treatments of joint cost:

	Desirability				Feasibility				
	4	3	2	1	4	3	2	1	Rating
- Exclude from analysis			2	4	2	1		2	N
- Evaluate the marginal cost of use		5	1		2	2	1		N
- Evaluate the average cost of use	3	4			4	2			N
- Other (please specify) (Game Theory)	1					1			N

COMMENTS ON SECTION II -- QUESTION 5

-- By social discount rate, I mean one which includes inflation and also a term for deferred benefits. If the analysis is done in present dollars, the inflation effect might be neglected.

-- What if rates decrease and increase? What then? How about career patterns, change of jobs ?

COMMENTS ON SECTION II -- QUESTION 6

- -- Allocation of joint costs is a researchable issue. None of the first three is very good. The study should generate its own model, taking into account some of the recent advances in Game Theory (e.g. Shapley Value, nucleolus).
- -- Marginal costs would be most appropriate if you can identify the main use program. Average cost would probably be easier to obtain.

7. The opportunity cost of attending a vocational education program may enter in as one of the largest cost components in a cost-benefit analysis. An opportunity cost is the income a student would have earned had he/she been working rather than attending school. The appropriate estimator of income foregone may differ by program level. Please rate the desirability and feasibility of the following estimators of foregone income for the secondary, postsecondary, and adult vocational education levels.

a. For secondary vocational education, the appropriate estimator of the opportunity cost of attendance might be:

	Desirability				Feasibility				
- Zero, the individual would be attending school anyway		3	2	1	4	2			N
- The average income of individuals of high school age who are not attending school	1	4	1	1	4	1	2		N
- A weighted average of the two previous measures	2	1	1	2	3	1	1	1	N
- Other (please specify)	1				1				N
	4	3	2	1	4	3	2	1	Rati

b. For postsecondary vocational education, the appropriate estimator of the opportunity cost of attendance might be:

	Desirability				Feasibility				
- Zero, the student would be attending school anyway			3	3	3	1	1	1	N
- The average earnings of individuals of similar characteristics who are not attending school	3	4			4	3			N
- A weighted average of the previous two estimators			3	3	2	2	1	1	N
- Other (please specify) (Weighted average and comparison with costs of other education programs)	1				1				N
	4	3	2	1	4	3	2	1	Rati g

COMMENTS ON SECTION II -- QUESTION 7 a.

-- The measure should take into account some comparison with B - C of enrollment in other secondary programs as well as income of non-attendees.

COMMENTS ON SECTION II -- QUESTION 7 b.

7. c. For adult vocational education, the appropriate estimator of the opportunity cost of attendance might be:

	Desirability				Feasibility				
- Zero, the student would be attending school anyway			2	4	2		3	1	N
- The average earnings of individuals of similar characteristics who are not attending school	4	2	1		4	2	1		N
- A weighted average of the two previous estimators			2	4	2		2	2	N
- Other (please specify)									N
	4	3	2	1	4	3	2	1	Rating

8. Please evaluate the desirability and feasibility of utilizing the following measures of future earnings:

	Desirability				Feasibility				
	4	3	2	1	4	3	2	1	Rating
- Gross income (including investments)	1	2	2	2	2	2	1	2	N
- Annual labor earnings	4	2			4	1	1		N
- Individual hourly wage rates	1	2	3		1		2	3	N
- Other (please specify)	1				1				N

COMMENTS ON SECTION II -- QUESTION 7 c.

-- Characteristics of students will vary so much, data will be meaningless.

COMMENTS ON SECTION II -- QUESTION 8

-- I assume that all of these will be discounted to present values and will take account of ages of earners.

-- Will be difficult to obtain.

-- Hourly income could be used with the assumption that an individual is employed full time and can work full time.

9. Increased earnings resulting to a vocational education graduate have an economic impact greater than the net increase in the graduates' earnings. This results because a large portion of the increased earnings will typically be spent, increasing the income of another individual. Please rate the desirability and feasibility in a national cost-benefit study of accounting for this earnings multiplier effect.

Desirability				Feasibility				
4	3	2	1	4	3	2	1	Rating
4	2			1	4	1		ll

10. Please evaluate the desirability and feasibility of including non-pecuniary costs and benefits in a cost-benefit analysis.

Desirability				Feasibility				
4	3	2	1	4	3	2	1	Rating
4	2			3	2	1		

COMMENTS ON SECTION II -- QUESTION 9

-- This is not a transparent benefit and to use this concept will require considerable study. The basic economics of exchange imply that the worker values his wage received more than his time spent and that the employer values the work done more than the wage paid.

COMMENTS ON SECTION II -- QUESTION 10

-- This is very important and involves evaluating trade-offs between dollars and quality of life. Multicriterion benefit-cost models are beginning to emerge and should be looked into.

-- This is perhaps the most difficult aspect of this study to deal with.

11. Please evaluate the desirability and feasibility of including measures of the differences in quality of vocational programs in a national cost-benefit analysis.

	Desirability				Feasibility			
Rating	4	3	2	1	4	3	2	1
N	5	1	1		1	1	4	1

12. A student may be enrolled in vocational education for both investment and consumption reasons. It is part investment because a student is investing in "human capital" with the anticipation of future increases in income. It is part consumption since a student is consuming vocational education purely for immediate personal gratification. Evaluate the desirability and feasibility of measuring consumption benefits of vocational education in a cost-benefit study.

	Desirability				Feasibility			
Rating	4	3	2	1	4	3	2	1
N	3	3		1		3	3	1

COMMENTS ON SECTION II -- QUESTION 11

-- The potential political reactions to such measures make this a delicate matter. It is worth consideration but including such measures may lower acceptability of the whole effect.

-- Careful consideration of standard criteria for quality or effectiveness must be established.

COMMENTS ON SECTION II -- QUESTION 12

-- This area is very important, though probably very hard to collect data on. Many detractors of vocational education cite personal consumption as a waste, yet it is almost impossible to factor it out. The detractors feel the programs are too expensive to run so someone can learn how to fix their car or some other personal skill. These data could help to refute this.

-- This is closely related to 10.

III. QUESTIONS ON DATA AVAILABILITY

There are several sources of data that can be used in a national cost-benefit study of vocational education. The following questions consider some of these alternatives.

1. Please evaluate the desirability and feasibility of utilizing the following types of data in a national cost-benefit analysis of vocational education:

	Desirability				Feasibility				
Rating	4	3	2	1	4	3	2	1	
- Existing data bases	2	3	1		2	3			N
- Existing data bases supplemented by survey data	5	1			2	4			N
- Survey data collected exclusively for the cost-benefit study	2	2		1	2	2		1	N

2. Please evaluate the desirability and feasibility of using the following data bases in a national cost-benefit study:

	Desirability				Feasibility				Not Familiar With Data Base	
	4	3	2	1	4	3	2	1		Rating
- National Center for Educational Statistics' (NCES) Vocational Education Data System (VEDS)	1	1	2		1	3			1	N
- Bureau of Occupational and Adult Education's (BOAE) Statistical Reports, 1973-1978	1	2	1		1	3			1	N
- NCES' High School and Beyond Longitudinal Survey (1980)	1		1	1	1	1		1	2	N
- Department of Labor's (DOL) National Longitudinal Survey (1979)		1	1	1		1	1	1	2	N
- NCES' National Longitudinal Survey of the High School Class of 1972		1	1	1	1		1	1	2	N
- National Institute of Education's (NIE) Survey of Vocational Schools in Ten States (1980)			1	1		1		1	3	N

COMMENTS ON SECTION III -- QUESTION 1

-- The major reliance should be on existing data bases but there may be gaps which require survey data.

COMMENTS ON SECTION III -- QUESTION 2

-- You may need a cross-checking of these data bases for verifying data needed for a cost-benefit study.

-- Recommend that you conduct your own sample - could use existing data bases to draw sample - under these cirucumstances a higher rating could be made on some of the data bases listed. The VED's System would probably be best for this use on vocational students. You would need another base for more vocational students from one of those listed of which I am not knowledgeable.

2. (cont'd.)

	Desirability				Feasibility				Not Familiar With Data Base	Rating
	4	3	2	1	4	3	2	1		
- NCES' Survey of Noncollegiate Postsecondary Students and Schools (1972-1980)		1		1		1		1	4	N
- Assistant Secretary for Planning and Evaluation's (ASPE) Survey of Vocational Education Students and Teachers (1972)	1		2	1	1		1	1	1	N
- Office of Civil Rights' (OCR) Survey of Vocational Education Schools (1979)	1	1	2		1	1	2		1	N
- Office of Education's (OE) "437 Files" (Grants and Expenditures under State Administered Programs)			1	1		1		1	3	N
- Census Bureau's Current Population Survey Supplement	1	2		1	1	2		1	2	N
- Project Talent Data Base	1			1	1			1	4	N
- NCES' Survey of Course Offerings and Enrollments (1973)				1				1	5	N
- Survey Research Center's Youth in Transition Data Base (1966)				1				1	5	N

ROUND TWO

I. QUESTIONS ON GENERAL STUDY DESIGN

The following questions deal with general issues in the design of a national cost-benefit study of vocational education.

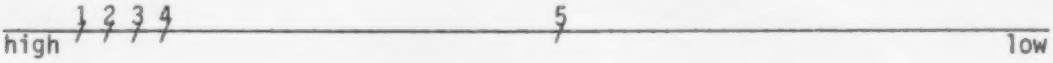
1. A national cost-benefit study of vocational education must be designed to meet the needs of its users. Please rank,in order of preference, the desirability of designing a study which would yield information to meet the needs of the following user groups:

	Mean *
-- Individuals, whose needs might include determining whether vocational training will result in increased income, career advancement, or other benefits	3.8
-- Educational institutions, whose needs might include increasing the efficiency of vocational programs	3.7
-- Local education agencies, whose needs might include securing efficient investments in vocational programs	3.2
-- State education agencies, whose needs might include determining how to distribute educational revenues to maximize educational output	2.0
-- Federal Government, whose needs might include allocating federal funds to the most efficient alternative programs	2.3
-- Other (please specify)	

*Mean indicates the mean value assigned to this option by panelists.

COMMENTS ON SECTION I -- QUESTION 1

-- Dissemination of relevant information to individuals is important, but I feel that for them there are better approaches than benefit-cost models, except perhaps at the nominal level. The other four groups have comparable needs and the shadings between the ratings 1-4 are small compared with the differences with individual needs (5). i.e.



-- The federal government's needs would entail the use of cost-benefit data in judging the return on investment. It may be necessary or desirable to fund programs which have both high costs and high benefits. Funding decisions might not always favor the most efficient alternative programs.

-- Focusing upon meeting needs of local education agencies, a cost-benefit study shall be made, then the study can be expanded toward meeting other agencies' needs.

-- I would target on my first (state education agencies) and second (Federal Government) rankings.

-- The RFP should have made clear that the main purpose of any resulting national cost/benefit study was to serve federal policy determination needs.

-- The usefulness of any program ratios at less than national policy levels is debatable, given the likelihood that these ratios will vary considerably across states, communities, and institutions.

-- The effectiveness and ultimate impact of study measures/findings will be determined according to its utility for those most directly involved in the provision and consumption of vocational services. Thus educational institutions, individuals and LGA's are the user groups of primary import in the development of any national cost-benefit study.

-- Given the recent White House economic victory in Congress, an emphasis on the needs of state education agencies would appear to be the most appropriate.

-- The ranking is based upon (1) the individuals needs being met. The remaining ranking is based upon the funding sources and their understanding of true need

2. Please rank, in order of preference, the desirability of each of the following possibilities in designing a national cost-benefit study of vocational education:

	Mean
-- Narrow the focus of the study to a single user and construct a compact model	2.8
-- Develop a broad and versatile model that would provide results that are meaningful to many or all potential users and on diverse programs	1.8
-- Construct several models that separately address the information needs of different users and the characteristics of different programs	1.4

3. Please rank, in order of preference, the desirability of each of the following considerations in designing a national cost-benefit study of vocational education:

	Mean
-- Study design should be dictated by the current availability of data	2.1
-- Study design should be dictated by model construct capabilities	1.4
-- Study design should be dictated by cost considerations	2.4

COMMENTS ON SECTION I -- QUESTION 2

-- A good broad model can be specialized to achieve the goals of the other two statements. However, if a single user is paying for the model, he has a right to expect it to be focused on his needs.

-- The most useful and productive approach may be option 3 with some degree of data compatability to assure that outputs can be aggretated across models for different users, e.g. community colleges, AVC's, etc.

-- I do not think it is possible to design a single model which will serve all potential users within realistic cost constraints.

While the basic procedures for determining cost and benefit might be the same (or similar) regardless of level of aggregation (national, state, or local), the procedures for program selection (universe or sample) and the approach to data acquisition would vary considerably.

The model should be practical rather than theoretical. An elegant model which cannot be applied is of no use, in my opinion.

-- The development of several discrete models will provide the necessary breadth and depth in addressing the critical areas of assessment - i.e. the dimensions related to multiple educational levels and varied user groups. Strategies for the analysis of common program elements (which would be available through the broad and versatile model design) should be incorporated into the multiple model study design.

-- Only by developing a number of models is it possible to take into consideration the myriad of diverse needs of the many potential users. "A broad and versatile model" would provide severely limited information.

-- A broad model would allow many individuals and agencies to use the information.

COMMENTS ON SECTION I -- QUESTION 3

-- If the design requires expenditures beyond the project budget, it has no chance to have a good outcome. However, once budget feasibility is established, the model should not be strictly limited by currently available data since one major benefit of a b-c model is identification of data needs.

-- Since a national cost-benefit study has yet to be developed for/by vocational education, it is not likely that the currently available data will be adequate or appropriate.

-- Given that 1) current data availability and potential resources for the study pose severe programmatic constraints, and 2) the quality of study activities and findings are dependent upon a solid, comprehensive model design, the consideration of model construct capabilities are paramount. Of course the delimiting factors cited in point 1 (above) will necessitate flexibility in the development of the model.

4. The scope of a national cost-benefit evaluation is of particular concern. The larger the scope, the more generalizable are the results. However, the larger the scope, the less specific are the results concerning educational level and program area. Please rank, in order of preference, the desirability of conducting a national cost-benefit study of the following educational levels:

	Mean
-- An examination of secondary vocational education programs only	2.6
-- An examination of postsecondary vocational education programs only	3.1
-- An examination of adult vocational education programs only	4.0
-- An aggregated examination of secondary, postsecondary, and adult vocational education programs	3.9
-- An examination of secondary, postsecondary, and adult vocational education programs with each level analyzed separately	1.0

COMMENTS ON SECTION I -- QUESTION 4

-- Since vocational education is a relatively large and diverse national enterprise, it would be most helpful to examine all levels independently. If one had to choose between the three levels, however, the preference should go to the secondary level because it represents the largest enrollment and resource consumption.

-- The types of benefits differ considerably by institutional level. For example, while job placement rates and earning levels might be the most appropriate benefit measures for postsecondary and adult programs, the benefit of secondary programs might be most appropriately judged by levels of skill proficiency or attitudinal changes. Consequently, I do not see how an aggregate benefit assessment across institutional levels could be fairly constructed.

The postsecondary and adult option (combined) was selected second because I feel traditional cost/benefit analyses are most easily applied at these levels than at the secondary level.

-- Separate analysis of vocational education programs will allow for the specificity required for a valuable cost-benefit study. However, a cross study analysis of several relative cost-benefit measures across several management and program content variables is encouraged.

-- A national cost-benefit evaluation restricted to a particular program level or aggregated over all levels would be of little use.

-- The #1 ranking would allow for the generation of both general and specific data.

II. QUESTIONS ON MEASUREMENT ISSUES

Numerous measurement problems will confront a study team performing a national cost-benefit analysis of vocational education. The following questions present some of the concepts that may result in measurement problems.

1. One of the first problems encountered when considering a cost-benefit analysis is to determine who is a vocational education student. Please rank, in order of preference, the desirability of using the following criteria for determining a vocational education program participant:

	Mean
-- Enrollment in at least one vocational class	2.9
-- Enrollment in more than one vocational class	2.4
-- Enrollment in a fixed series of related vocational classes	1.8
-- A combination of the above three measures	3.0
-- Other (please specify)	

2. Once an appropriate determination has been made on what determines a vocational education program participant, a suitable method for counting these students needs to be determined. Please rank, in order of preference, the desirability of using the following measures of student participation:

	Mean
-- Average Daily Attendance (ADA)	2.8
-- Average Daily Membership (ADM)	3.3
-- (ADA + ADM)/2	3.3
-- Full-time Equivalent (FTE)	1.5
-- Other (please specify)	

COMMENTS ON SECTION II -- QUESTION 1

-- At the post-secondary and adult levels clearly the interest lies with students training for a specific occupation. However, at the secondary level where the purposes and benefits of vocational education participation can be more broadly construed, attention should also be paid to students in exploratory vocational education programs. That is to say care must be taken at the secondary level in distinguishing between those students in occupational specific programs and those students in exploratory or prevocational programs. Different benefit measures should be applied. In any case, the benefits should not be averaged.

-- If one distinguishes grades of vocational education students as provided in II-2 below, then I would change the ratings to 1, 3, 4, 2, with

1 2,3,4

-- Nearly all states have established vocational program course sequences through which students accumulate skills over a period of 1-2 years.

-- You have to define the level of programs - class level, course level, or program level. Personally, I would like to suggest the level of program for a national study.

-- I would very much have liked to have seen a question related to a program rather than a class. If this was available under other, I would have rated it #1.

-- FTE provides for the most accurate measurement of student participation time in a vocational program.

COMMENTS ON SECTION II -- QUESTION 2

-- Clearly student contact hours in the program is the preferable approach to measuring program participation. However, an ADA or ADM count combined with a sorted enrollment count (II above) would be satisfactory.

-- FTE is an excellent measure of load on the system (I assume this is based on some equivalence with credit hours of enrollments.) However, seriousness of participants is measured by average daily attendance. I suggest for a class the measure:

(No. of hours per week) X (No. of enrollees) X R

where R is a reduction factor to account for absentees. R should probably not be linear.

-- Use one criteria to be universally adaptable!

-- Other Some other indicator measuring participation except attendance or membership. ADA and ADM are completely unsatisfactory to me as an indicator of a participant.

-- Since instructional service outputs are for students, the more appropriate unit for study would seem to be a measure of student service unit. The more precise and widely applicable cost unit appears to be the concept of the FTE student, based on a standard number of student contact hours.

3. The costs and benefits resulting from vocational education need to be compared to those of one or more alternative activities. Those comparison activities may differ by educational level.

   a. Please rank, in order of preference, the desirability of comparing the costs and benefits of secondary vocational education with the costs and benefits of:

	Mean
-- Attending a general education program	1.8
-- Attending a college preparatory program	2.3
-- Not attending secondary school	2.8
-- A weighted average of the three previously mentioned activities	2.7
-- Other (please specify)	

   b. Please rank, in order of preference, the desirability of comparing the costs and benefits of postsecondary vocational education with the costs and benefits of:

	Mean
-- Attending a two-year general curriculum college	2.0
-- Attending a four-year general curriculum college	3.1
-- Not attending a postsecondary school	2.1
-- A weighted average of the three previously mentioned activities	2.7
-- Other (please specify)	

COMMENTS ON SECTION II -- QUESTION 3 a.

-- It is not clear to me why a comparison of the vocational educational cost/benefit ratios to those of the ratios discovered for other programs is necessary or particularly valid-particularly in terms of the college preparatory program. I suppose if one discovered that general education students (with careful matching of ability and SES background) did about as well as Vo Ed students in terms of employment and wages at substantially lower programs costs one might use the information for allocation decisions. However, I'm not at all comfortable with where such ratios comparisons might lead policy makers. Present cost/benefit ratio studies assign much higher values to elementary and junior high education than to the higher grades. Similarly lower education scores higher than higher education. What are we to make of this in terms of public policy?

-- Parents and students alike will find information on the costs and benefits of vocational education most helpful when trying to judge its value relative to college prep programs.

-- How would you give a different weight to three areas?

-- Other - other non-public voc. programs, CETA programs. I do not believe the study should compare academic and voc. ed.

COMMENTS ON SECTION II -- QUESTION 3 b.

-- One might want to compare the relative effectiveness and efficiency of vocational education training at the post-secondary and secondary levels. Although this would be a difficult task to do fairly.

The most appropriate comparison would be between two populations with similar occupational goals - one of which participated in post-secondary Vo Ed and the other which did not.

-- Here again, such information will be extremely useful in career planning for potential post-secondary students.

4. The costs and benefits of vocational education accrue to various individuals and groups. An essential consideration for any cost-benefit calculation is to determine for which entity (i.e. an individual or society as a whole) costs and benefits should be evaluated in a national study. Please rank,in order of preference, the desirability of evaluating the cost and benefits accruing to the following:

	Mean
-- The vocational education enrollee	1.6
-- Society as a whole (including the enrollee)	1.6
-- Society exclusive of the vocational enrollee	3.0
-- Other (please specify)	

5. The allocation of "joint costs" presents a problem for cost-benefit evaluators. Joint costs occur when an educational input, such as a teacher, piece of equipment, or school building, is used by more than one student group. Please rank,in order of preference, the desirability of the following treatments of joint cost:

	Mean
-- Exclude from analysis	3.4
-- Evaluate the marginal cost of use	2.1
-- Evaluate the average cost of use	1.6
-- Evaluate using game theory	3.3
-- Other (please specify)	

COMMENTS ON SECTION II -- QUESTION 4

-- The primary concern of the study should be with individual benefits by program.

-- This rates the "who benefits" "who pays" question.

1/ 2/ 3/

Both society as a whole and the individual enrollee must have net positive gain (benefit-cost) for the program to be workable.

-- Difficulties exist with measurement of the non-economic costs and benefits associated with vocational education, e.g. increased levels of employee/worker satisfaction.

-- Other: Special populations, including rural, urban, bilingual, and handicapped populations.

COMMENTS ON SECTION II -- QUESTION 5

-- In measuring costs, the model should attempt to strive for reasonable precision where such precision is likely to make a significant difference in cost calculations. For instance a classroom in which distributive education is taught will vary little in construction costs from a regular classroom (averages would be appropriate). On the other hand the costs of constructing a heavy machine shop should not be averaged with total building costs.

I don't understand the point of the question when it speaks to teachers. I see no problem with using average teacher salaries given a single salary schedule (if that is what is meant). If a teacher splits his time between Vo Ed and the general curriculum, then his salary should be prorated according to program assignment.

-- Other: judicious use of all three methods. For starting a new added program, marginal costs may be the best; for evaluating a whole system, average cost is attractive; game theory methods are relevant when considering several different added programs or combinations thereof.

COMMENTS ON SECTION III -- QUESTIONS 1, 2, 3

(The following questions are designed to allow panelists input in suggesting issues and questions that they feel are important in designing a national cost-benefit study of vocational education.)

1. Please list what you consider to be the two major obstacles to performing a national cost-benefit analysis of vocational education:

Obstacle I The most important obstacle is defining and identifying the control groups from which the marginal benefits of vocational education training can be derived.

Obstacle II Constructing operational measures of the benefits of the non-occupational specific secondary vocational education programs and translating these into monetary values.

Obstacle III Obtaining valid employment and wage histories of students.

Comments:

2. Briefly describe a strategy for overcoming, minimizing, or dealing with each obstacle listed in response to the previous question.

Obstacle I

Obstacle II

Comments:

1. Please list what you consider to be the two major obstacles to performing a national cost-benefit analysis of vocational education:

Obstacle I Lack of good measures for non-monetary costs and benefits.

Obstacle II Critical gaps in the data base.

Comments: Observations of the national, state, and other decision-making leads to the conclusion that political and quality of life factors play crucial roles. Hence, models which neglect these or dismiss them with the disclaimer that "since they con't be measured, we will omit them from our model" are seriously deficient.

One feature of model building is that a good theoretical model helps pinpoint what the crucial data needs are. It usually is the case that some of the needed data has never been collected, tabulated or stored (in accessible form).

2. Briefly describe a strategy for overcoming, minimizing, or dealing with each obstacle listed in response to the previous question.

Obstacle I The Rice-TIRR group has focused on handling non-monetary costs and benefits in rehabilitation. Some of their results seem applicable here. (Most of their reports are in the REHAB files.)

Obstacle II Several approaches are: a) set up an MIS (Management Information System) to process and handle such data as are available; b) encourage adding important items to statutory reporting systems; c) find acceptable surrogates which are available.

Comments:

1. Please list what you consider to be the two major obstacles to performing a national cost-benefit analysis of vocational education:

Obstacle I Developing a model or series of models which will meet the expectations and needs of the diverse and numerous user groups.

Obstacle II Suggesting ways to measure the non-economic costs and benefits of vocational education.

Comments:

2. Briefly describe a strategy for overcoming, minimizing, or dealing with each obstacle listed in response to the previous question.

Obstacle I Once a model or series of models is developed, a series of rigorous field tests with each of the major user groups from a representative sample of states should be conducted. The further development and evaluation of the models involve a sizable group of vocational education leaders over an extended period of time (2-3 years) to assure.

Obstacle II Continue to review the literature and discuss this issue with knowledgeable individuals.

Comments:

1. Please list what you consider to be the two major obstacles to performing a national cost-benefit analysis of vocational education:

Obstacle I The quality of data - need a unified data system including common definitions of data items and systematic data collection.

Obstacle II Finding group comparable with others.

Obstacle III Sensitivity of information opening to the "public".

Obstacle IV Need a cooperative participation of selected agencies and individuals.

Comments:

2. Briefly describe a strategy for overcoming, minimizing, or dealing with each obstacle listed in response to the previous question.

Obstacle I May need a longitudinal approach to data definition and collection.

Obstacle II A unified data system

Obstacle III and IV A cooperative participation of selected agencies.

Comments:

1. Please list what you consider to be the two major obstacles to performing a national cost-benefit analysis of vocational education:

Obstacle I Determining the specific cost per program and then aggregating to represent a cost of Vocational Education. Both Direct and Indirect costs.

Obstacle II Getting an agreement on what benefit to measure and then measuring the benefit or benefits.

Comments: There exists little information today in regard to cost per program. One can get from existing reports expenditures from local, state, and federal levels, but this is probably not a good indication of actual cost because so many variables are related that may not be directly related to training. A few years ago we developed standardized cost per program and I can tell you it is a lengthy exercise. When you start prorating over secondary, postsecondary, and adult it is even more complicated.

I assure you that an agreement cannot be reached on benefits. In the study that was conducted here in Oklahoma we attempted this. We ended up with six objective functions: (continued on next page)

2. Briefly describe a strategy for overcoming, minimizing, or dealing with each obstacle listed in response to the previous question.

Obstacle I Narrow down exactly what kind of cost you are going to use and represent your study as a study that has been conducted under this specific set of assumptions.

Obstacle II The same as the above comment. Acceptance of benefits are extremely difficult to get. You may want to measure benefits under different alternatives.

Comments: A constraint that you need to be aware of is the fact that you do not have an unlimited supply of individuals that can enter any level of employment that they choose. You really have a supply of persons that have varying attitudes and abilities and the benefits derived from vocational training may be a great return to cost if this was considered.

Based on previous research done in this unit we had access to 40,000 sophomores, 10,000 seniors, and 10,000 adults' GATB scores to use as an indicator with supply. When trying to fill jobs we found that certain occupations competed for the same GATB scores and that our supply of individuals were not available to satisfy all the job vacancies.

1. Comments (continued):

1. maximize entry level wages;
2. maximize supply;
3. maximize returns to taxes;
4. maximize to fill demand for trained workers;
5. maximize number of students served;
6. minimize costs.

If you cannot get agreement on benefits to be measured then no one will accept your study. Therefore, I assure you that you have a challenge.

1. Please list what you consider to be the two major obstacles to performing a national cost-benefit analysis of vocational education:

Obstacle I Lack of common definitions of what a Voc. Ed. program is in the various states.

Obstacle II Lack of complete fiscal information at many levels.

Comments:

2. Briefly describe a strategy for overcoming, minimizing, or dealing with each obstacle listed in response to the previous question.

Obstacle I Set a standard for the study only.

Obstacle II Collect the data.

Comments:

1. Please list what you consider to be the two major obstacles to performing a national cost-benefit analysis of vocational education:

Obstacle I The inclusion of non-pecuniary costs and benefits in the study.

Obstacle II The consideration of the impact of vocational programming upon special populations (i.e. rural, urban, bilingual, and handicapped).

Comments: This is probably the most difficult measurement area upon which to gain consensus. However, it is an area in which vocational education stands to promote its most compelling justification for existence - social (as well as economic) benefits.

This consideration is particularly critical to federal and state administrations as a result of set aside requirements for special populations.

2. Briefly describe a strategy for overcoming, minimizing, or dealing with each obstacle listed in response to the previous question.

Obstacle I If the study team selects the method of measuring non-pecuniary benefits according the monetary values, an additional Delphi procedure will be required to determine the variables to be selected and the weighting of such variables.

Obstacle II The study team may wish to devise strategies for the collection of special population data from 1) segregated vocational programs, and 2) integrated, regular vocational programs which include representatives from identified special populations. Data collected for these populations should be equivalent to the data collected for the general study populations.

Comments:

1. Please list what you consider to be the two major obstacles to performing a national cost-benefit analysis of vocational education:

   Obstacle I   Securing clear accurate data that is transferable throughout the U.S.

   Obstacle II   Money and time. A study of this nature should have the time and resources to develop a research model or models that will be researchable and yield the data needed to be a comprehensive cost-benefit study.

   Comments:

2. Briefly describe a strategy for overcoming, minimizing, or dealing with each obstacle listed in response to the previous question.

   Obstacle I   Develop several methods of gathering data based upon the uniqueness of states.

   Obstacle II   With the current mood in Washington, about the only hope is time to do the job. Money will not be forthcoming.

   Comments:

3. Please write two questions that you feel must be addressed by a research team in designing a national cost-benefit analysis of vocational education.

These questions can deal with measurement problems, study methodology, user groups, data availability, or any other issue of your choice as long as it has not been asked previously in this questionnaire. You do not have to answer the questions.

Question I -- How can appropriate managers be encouraged to use benefit-cost methodology and results?

Question II -- Where does one draw the line between inputs by the model builder and inputs from the responsible manager?
My thesis is that value judgements should be provided by the manager at as near as possible to the time he needs to make a decision.

Comments: One clue to this question is documentation. I mention two important levels:

A. Technical documentation
B. User documentation

A criterion for satisfactory technical documentation is transferability, i.e. a knowledgeable user should be able to understand (a) the definitions of all of the variables, (b) the data sources needed, (c) the underlying assumptions and (d) the logic supporting the equations well enough to apply the model without recourse to the model builder.

Relatively few models paid for by the U.S. Government meet this criterion. However, the Dept. of Energy now requires archival storage (at its Argonne Laboratories) in transferable form.

User documentation is even rarer than good technical documentation. What I have in mind here includes verbal formulation of all equations, assumptions, etc. so that a manager can understand the thrust of the model even though he is not a specialist (i.e. knowledgeable) in model building.

(If this question is followed up, I can provide a number of references.)

3. Please write two questions that you feel must be addressed by a research team in designing a national cost-benefit analysis of vocational education.

These questions can deal with measurement problems, study methodology, user groups, data availability, or any other issue of your choice as long as it has not been asked previously in this questionnaire. You do not have to answer the questions.

Question I -- What data are currently collected by states or are available from national sources (e.g. NCES) that could be analyzed and used as gross indicators of the costs and benefits of vocational education for various special needs populations?

Question II -- Why should vocational educators at all levels be concerned with cost-benefit analysis?

Comments:

3. Please write two questions that you feel must be addressed by a research team in designing a national cost-benefit analysis of vocational education.

   These questions can deal with measurement problems, study methodology, user groups, data availability, or any other issue of your choice as long as it has not been asked previously in this questionnaire. You do not have to answer the questions.

   Question I -- Attempt to analyze preliminary data available to each of the selected local agencies.

   Question II --

   Comments:

3. Please write two questions that you feel must be addressed by a research team in designing a national cost-benefit analysis of vocational education.

These questions can deal with measurement problems, study methodology, user groups, data availability, or any other issue of your choice as long as it has not been asked previously in this questionnaire. You do not have to answer the questions.

Question I -- Are you planning to use aggregate data or individual program data?

Question II -- How are you planning to get information to study cost-benefit if aggregate data are not used?

Comments:

3. Please write two questions that you feel must be addressed by a research team in designing a national cost-benefit analysis of vocational education.

These questions can deal with measurement problems, study methodology, user groups, data availability, or any other issue of your choice as long as it has not been asked previously in this questionnaire. You do not have to answer the questions.

Question I -- What are the non-pecuniary benefits derived from vocational education (i.e. secondary, post-secondary, and adult programming)?

Question II -- What have been the economic and non-pecuniary benefits of vocational programming (i.e. secondary, post-secondary, and adult) on special populations (i.e. rural, urban, bilingual,and handicapped)?

Comments:

3. Please write two questions that you feel must be addressed by a research team in designing a national cost-benefit analysis of vocational education.

These questions can deal with measurement problems, study methodology, user groups, data availability, or any other issue of your choice as long as it has not been asked previously in this questionnaire. You do not have to answer the question.

Question I   How are special needs students being accomodated in vocational education and how does the cost of their involvement affect the program within which they are enrolled?

Question II   What is the payback period (taxes and non receipt of welfare) for graduates of vocational programs as opposed to non-vocational graduates?

Comments:

APPENDIX D
LIST OF PARTICIPANTS AT THIRD ROUND DELPHI CONFERENCE

CONFERENCE ON THE FEASIBILITY OF CONDUCTING A NATIONAL COST-BENEFIT ANALYSIS OF VOCATIONAL EDUCATION

August 10, 1981 9 A.M. - 5 P.M.

LIST OF PARTICIPANTS

Dr. Ralph Bregman
National Advisory Council for Vocational Education

Ms. Barbara Dunn
Youthwork, Inc.

Dr. George Hagerty
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Division of Personnel Preparation

Dr. Paul Hippolitus
President's Commission on Employment of the Handicapped

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American Vocational Association

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REHAB GROUP, INC. STUDY TEAM

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Dr. Mark Shugoll - Principal Investigator

Mr. Tim Helms

Ms. Dorine Seidman

Dr. David Rodney

APPENDIX E
AGENDA FOR THIRD ROUND DELPHI CONFERENCE

CONFERENCE ON THE FEASIBILITY OF CONDUCTING A NATIONAL COST-BENEFIT ANALYSIS OF VOCATIONAL EDUCATION

August 10, 1981 9 A.M. - 5 P.M.

AGENDA

9:00---------------Continental Breakfast

9:20---------------Introductions

9:30---------------Overview of the Rehab Group, Inc. study effort

9:45 - 10:45-------Discussion: Evaluating the merits and parameters of a national study

10:45 - 11:00------Break

11:00 - 12:00------Discussion: Identification and measurement of vocational benefits

12:00 - 1:30-------Lunch

1:30 - 2:30--------Discussion: The availability and quality of data on vocational programs and vocational students

2:30 - 3:30--------Discussion: Issues identified by conference participants

3:30 - 3:45--------Break

3:45 - 4:45--------Discussion: Conclusions on the overall feasibility and utility of a national cost-benefit study

4:45 - 5:00--------Closing remarks